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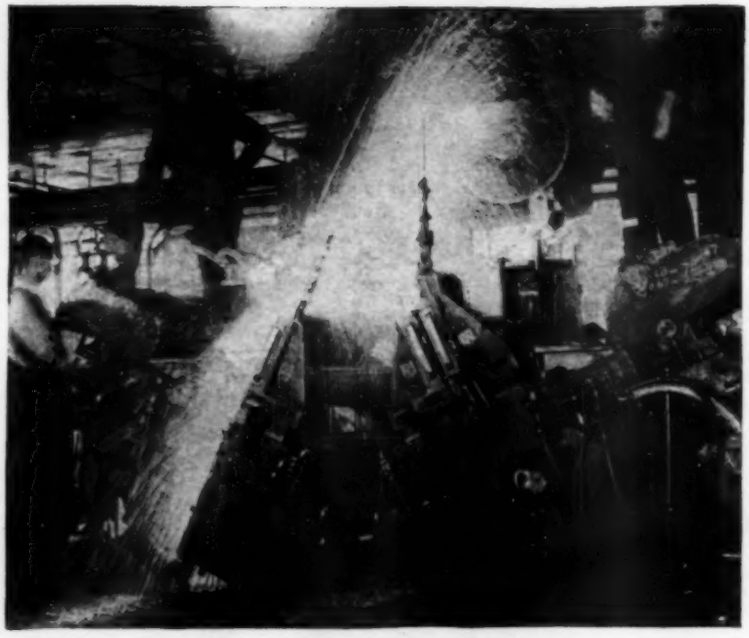
Five Welding Methods in One Shop



16,000 amp. per sq.in. make quite a display. A flash welder in operation on a Nash body

In fabricating Nash bodies, the Seaman Body Corporation has learned that no one method of welding has universal application

SO CLEVERLY is the automobile body fabricated that it looks to the causual observer like a single piece of sheet steel drawn to shape. But shop men know that it is made like a patchwork quilt—many pieces fastened together. Welding is the accepted practice today, but no single method of welding suffices. In the manufacture of Nash bodies at the Seaman Body Corporation, for example, no less than five different forms of welding are used. Conditions justify gas welding in one place, flash butt welding in another, machine spot welding in a third, gun spot welding in a forth, and arc welding in a fifth. In addition, gas soldering is also used at certain points. As if all these methods of fastening were not enough, rivets are used for good measure and carriage bolts and wood screws hold the steel frame assembly to the wood floor sill and to the plywood posts that stiffen the doors and body.

Selection of methods is governed by a number of factors including: appearance of the finished weld and of the surrounding metal; economy of production, wherein a compromise is made between low operating and fixture cost, and the time and effort necessary to clean up the surface for lacquering; expediency; and security required of the weld, this being governed by the position of the panel welded with relation to strains. Changes in methods have made possible changes in body design. The old form of T-molding which concealed the intersection of the rear section of the body and the side quarter panels has given way to a smooth, unseen joint produced by automatic flash welders. Similarly, welding of the cowl top and sides eliminates both the high die cost required for a one-piece cowl and the squeaking of jointed panels.

Flash-welding operations are suitable only where the surfaces joined lie in the same plane; otherwise the problem of making suitable electrodes for applying the current to the work would be of such magnitude as to introduce serious cost limitations. The electrodes, in

pairs, grip the work on each side of the sheet and are clamped pneumatically under heavy pressure to prevent a local arc being started between the work and the electrode, with consequent destruction of the sheet. One set of electrodes is movable with respect to the other to keep up with the consumption of material in maintaining the arc. Both fixed and movable electrodes at the start grip the sheet $\frac{3}{8}$ in. from the edge, but by the time the point of fusion is reached and the ram-up pressure applied by a quick-acting lobe on the control cam, $\frac{3}{16}$ in. of metal is gone from each sheet. The large volume of copper in the electrodes brings about almost instantaneous cooling. By the heavy clamping pressure, however, expansion of the metal during heating and contraction during cooling are both at a uniform rate at all points along the sheet. As a result, there is no distortion of this 19-gage material.

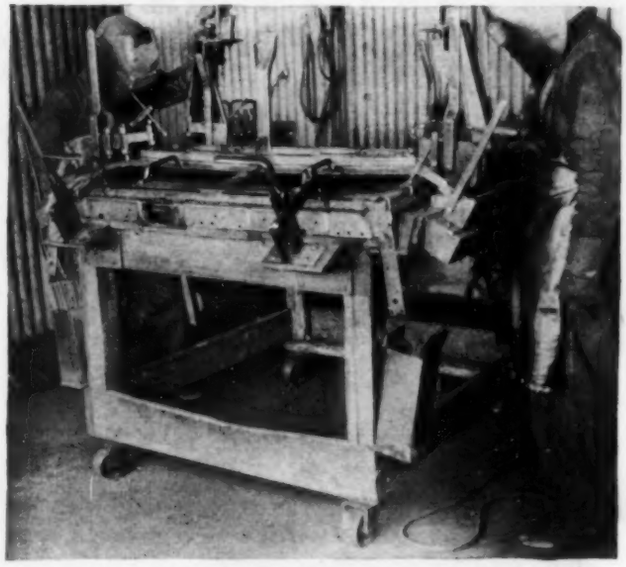
This type of work calls for high currents at low potential—7½ volts maximum. Transformer capacity is usually figured on the basis of 100-125 kva. per sq.in. of area on thin-gage material. On the large flash welder for the rear body panels, for example, a weld 42 in. long in 19-gage sheets calls for 200 kva. on a side, which means 28,500 amp. at 7 volts, or about 16,000 amp. per sq.in. Obviously, only one side is welded at a time. The primary current runs about 350 amp., which produces a severe jolt on the line, but with fifty gun spot welders drawing large currents and a large number of machine welders in simultaneous operation, this is well ironed out at the incoming bus.

Simple Fixtures Reduce Fatigue

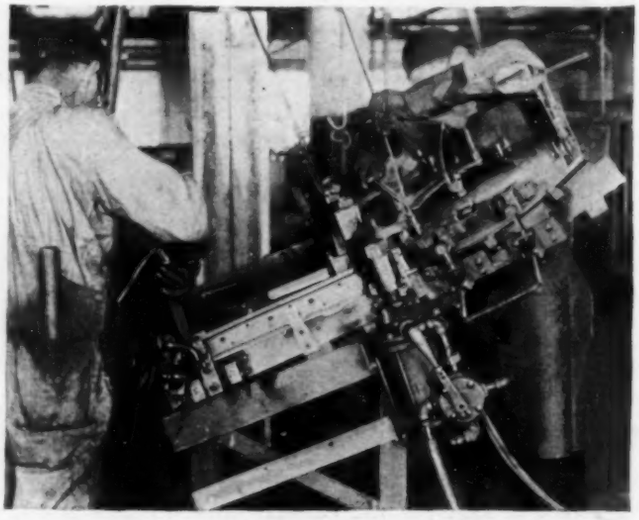
Because of the coplanar intersections of the sheets, the electrodes can be made of flat plate with the desired curvature at the edge. To reduce fatigue of the three operators, the upper electrodes are hinged at one end and are swung out of the way by counterbalances acting through flexible steel cables. Fixtures for supporting the body sections are of the simplest type, constructed as skeletons of flat plates formed to shape on their edges and welded together. Since their chief function is to hold the sheets of large surface but light weight in a fixed position relative to each other, little clamping pressure is required other than that found in a simple toggle. All pressure necessary for developing a proper weld is supplied through the pneumatic electrode grips.

These flash welders are special-purpose machines, but are flexible enough in design to facilitate change of one body to another without great expense in replacement of fixtures and electrodes. Thus it is more economical to flash weld the simple curves of the intersections and to leave odd corners for later hand welding. This is true in the new Nash bodies where there is an 18-deg. apron flare at bottom of the back. While it would be possible to flash weld this apron with the rest of the back, Seaman Body engineers choose to gas weld this portion in a succeeding operation rather than weld at an angle across the molding. Gas welding is not as clean-cut here as flash welding, but the flare produces a corner that makes finishing by the usual flexible disk grinder a simple matter.

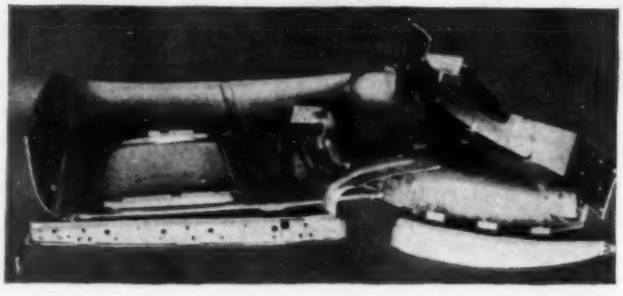
For this hand welding, the shell is laid on its back in a simple wood skeleton fixture and is clamped at a

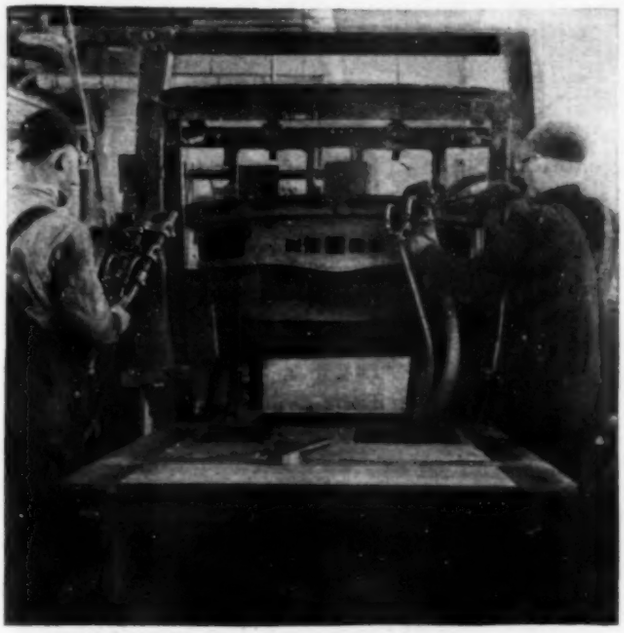


Successful arc welding of thin-gage material depends upon full pressure contact of the loose assemblies against a well-grounded metal back. Eight toggle clamps supply the pressure on this assembly, consisting of nine subassemblies in stock from 12- to 18-gage

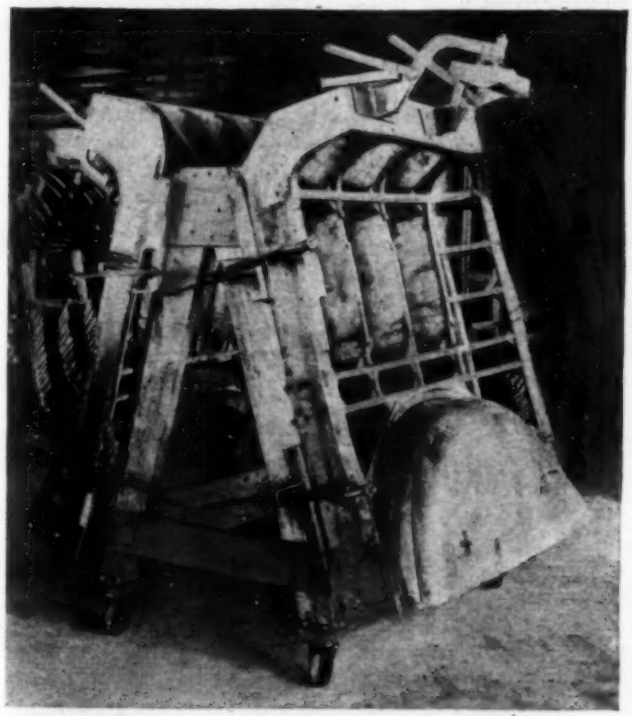


***Above*—Tack welding by spot gun and gas torch is performed in this jig and is followed by machine spotting. *Below*—The four subassemblies. The side quarter panel, the hinge pillar brace, and the gooseneck or dog-leg panel are gas tack welded to the wheel house, while the hinge pillar is gun spotted to the side quarter panel**





Final assembly of major subassemblies is one place where gun welders do a finish spotting job in place of preliminary tack welding. Two guns, fed from a single transformer, are at the disposal of each man



Sheet metal assemblies are checked against skeleton forms matched to the original wood dummies

few points simply to stabilize it. A low-carbon steel rod suffices for this and all other gas or arc welding work. While the shell is in this position the welder also brazes the hollow bead on the inside at the flash-weld line. Otherwise, later finishing operations might be carried so far as to leave a hole in the thin shell there.

Particularly where corners of small sections are being joined, gas welding is preferred since the simplest kind of a jig suffices to hold the parts. Jigs for arc welding thin-gage sheet metal are often more expensive and complicated, since the work should be backed by a conductor at all weld points, and adequate pressure must be developed between the work and the grounded fixture to prevent a burnout at this point. For efficiency in set-up, quick means for getting the work in and out of the fixture and clamping it are essential. It is difficult to fulfill these conditions in arc welding an inside corner. Where the work lies roughly in one plane, on the other hand, such as the front steel frame, it is possible to build up a simple arc-welding fixture on a table. Eight toggle clamps provide hold-down pressure. Copper busbars connect the metal faces screwed to the wood structure, keep down the resistance loss in the jig and provide the current where needed.

Another place where arc welding has been chosen is in fastening a 20-gage belt rail brace of the door to the 14-gage door pillar. Using a hinge form of fastening, the piece is fillet welded on one side and tacked through three punch holes in the middle of the angle plate. This method of fabrication is cheaper than riveting and simplifies the job by eliminating fillet welding around all four edges of the hinge.

Still another factor which aided in the choice of arc welding is the necessity of localizing the heat to hold down distortion. One of the most prominent pieces of the whole body, for example, is the front roof shell or peak panel. A sketch shows how the arc welding of the channel member is concealed from view and at the same time the visor edge does not show distortion from heat. It would be almost impossible to prevent this with gas welding. It is perfectly feasible and proper, however, to gas weld this same piece at the ends to the front post cover shells extending from the cowl sides. The reason is that this type of weld, being on a flanged corner, is relatively short and is subject to easy cleanup by soldering and disk grinding.

Current Fluctuations Burn No Holes

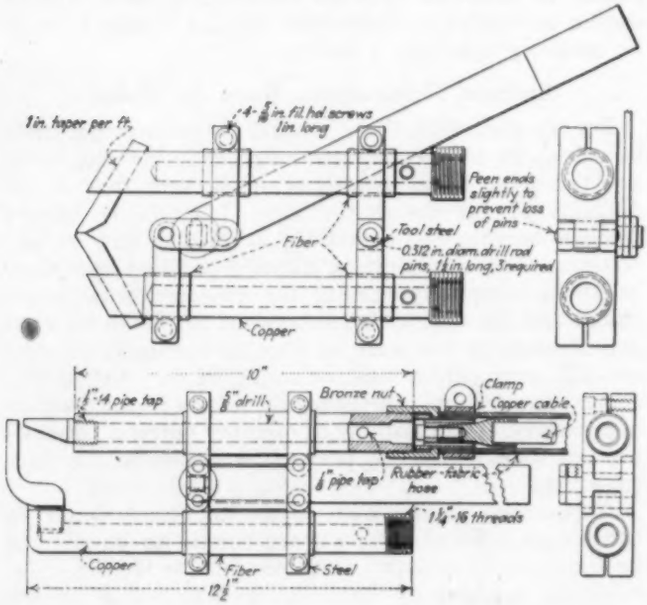
Besides distortion, there is another problem that must be solved in connection with this particular job, or in any thin-gage metal welded with the arc; that is the difficulty of preventing the sheet from being burned through because of fluctuations in welding current and voltage. For this work a Hansen welding generator has been completely rebuilt, the collector brushes adjusted and the field coils rewound to get 16 to 18 volts and 60 amp. at the weld in place of the usual 40 volts and 120 amp., which was the rating of the original machine. In addition, a resistance is set up in the welding line to prevent fluctuations of welding current. Reducing the voltage tends to prevent blowholes in the thin-gage metal.

Appearance of the weld is an important factor in body work. Finishing costs are certain to be affected by the damage, or lack of it, done by the welder. Gas soldering, molded by hand while hot, builds up the deficiencies of corner welds, but to remove a hollow depression left by a spot welding electrode is next to impossible with the usual flexible-shaft-driven disk

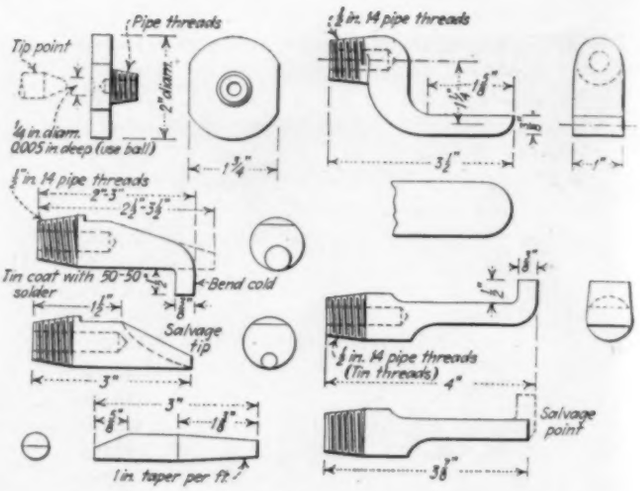
grinder, aside from the question of cost. In exposed positions, therefore, such as on the face of the instrument panel, it is the practice to raise a slight hump on the outside of the spot. This hump is readily removed with a disk grinder. To accomplish this, one electrode is in the form of a flat disk mushroom die with a ball imprint in the center; the other is in the usual flat point form. The depth of the imprint limits the raise on the sheet to not more than 0.005 in.

Most tack welding is out of sight and is done by gun spot welders. To one not familiar with a gun spot welder, a brief description is not amiss, particularly since the standard commercial gun construction has been modified to suit conditions encountered in body work. Chief considerations are reduction of bulk and weight, ruggedness of construction and ease in manipulation. Two general types, illustrated, take care of the usual run of work. Basically, the chief differences are in the shape and location of the electrodes and the closing motion. In one, the tips approach on an arc, in the other in a straight line. Both use water-cooled copper conductors insulated from the steel frames by fiber sheets $\frac{1}{16}$ in. thick. By special heat-treating, a tough core and a hard, wear-resisting case is produced in the steel parts. The procedure is to take water-hardening tool steel (0.90-C), heat it to 1,350 deg. F., and quench in oil, instead of water.

Not only are these conductors water cooled, but also the cable connections and the transformer. Heavy rubber hose surrounds each cable and water passes up one cable to the gun, through a flexible cross connection and down the other. An alternate arrangement is one in which the water returns from both cables to a Y-connection and separate return hose. Through the hollow conductors cooling is brought right up to the electrodes. This cooling is essential, for the welding current peaks at 6,000 amp. Once the operator clamps the work between the electrodes or points, he presses a thumb switch in the handle, energizing a relay which throws



Two forms of modified gun spot welders designed for body work. They are connected by water-cooled leads to standard Moesta transformers



A typical group of gun spot welding points designed to suit the shape of parts being tacked together

the primary contactor. An adept operator synchronizes his movements so that power is applied the instant clamping is effected. Release is almost as fast, so that to the observer it appears as simply a quick clamping action.

Most of the work these gun welders do is simply tack welding, which is followed by machine spot welding. One place where the gun welders must complete the job is in fastening large body subassemblies to each other. For example, an illustration shows the complete cowl assembly being attached to the front steel frame assembly carrying the instrument panel and door hinge pillars. Six toggle clamps and four cowl top guide fingers hold the assemblies to the structural steel fixture. Two men complete the welding, each using two guns alternately according to the body part. Each gun has contact points best suited to its task, and since only one is in use at a time, a single transformer supplies a pair of guns. To indicate how preference on the part of workmen varies, one man manipulates a counterbalanced gun; the other prefers to have his movements unimpeded by this additional cable.

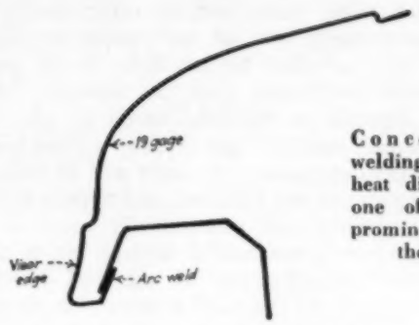
Wherever it is possible to make an overlap joint that is out of sight, the machine spot welders offer the fastest and cheapest method. This class of work at the Seaman plant takes place in manually and foot-operated machines, but some fully automatic machines are available where semi-exposure of the piece, such as a center pillar or instrument panel calls for a more careful job. The more exact timing and uniform pressure obtained minimizes discoloration and indentation of the work, thus saving in finishing time.

It has been indicated that fixture cost is a governing factor in the selection of the particular welding process. Except for arc welding, the only object of the fixture is to support the work adequately. For tack fastening with gun welders, a simple wood jig suffices, faced with metal to relieve the wear and tear and to act as a gage for hand shearing operations as required.

The same fixture will often serve the purpose for two types of welding. One of the illustrations shows a portable table fixture, itself made of welded steel shapes,

for gun and gas tack welding primary assemblies into a rear quarter panel. Where possible a self-contained gun welder is the choice, but in attaching the gooseneck panel to the wheel house, the reach is too great for the depth of throat of a gun and gas welding is the medium.

Sometimes the gun welder carries simply one electrode, and the circuit is completed through a grounded copper busbar built into the fixture. In attaching the dash panel to the cowl, for example, the dash is laid on a horseshoe-shaped flat busbar, the cowl laid on top, and the gun hooked over another horseshoe-shaped busbar of round cross-section above the first. The only cable connection needed for this type of gun is for the relay circuit to the thumb button. For safety reasons, this is armored in rubber hose. Spot welding of this kind is not much different from arc welding, in that the work must be well backed with a conductor and held to that conductor under adequate pressure to eliminate local arcing. Hence, in addition to the wedge cam action supplied by the operator as he hooks the gun over the upper bus, an air piston acting through a heavy cast-iron clamp plate applies pressure between the two sections being joined. This plate all but covers the dash panel and for ease in handling is counterbalanced by cable and weight. The same fixture serves to hold the cowl while the two halves of the front post cover shells



Concealed arc welding prevents heat distortion on one of the most prominent parts of the body

are gas welded and brazed at the cowl top and roof line joints.

In another type of busbar fixture, the work—a center pillar column in this instance—lies on flat copper bars of ample section, and the circuit is completed through the gun point and a single cable connection. The operator supplies the clamping pressure through manipulation of the gun handle in the usual way. One welding point contacts the work, the other the busbar.

Despite all these methods of welding, riveting still survives on the front door and front body hinge pillars. Using taper rivets, the operator "nails" them in place and heads them cold in a horning press. There are also some large hollow rivets between the wheel house and the kick-up support panel. Holes perforated for these rivets serve first to locate the two pieces relative to one another during machine spot welding, prior to riveting.

Modern Material Handling

GEORGE PAULL TORRENCE
President, Link-Belt Company

IN THESE days of widespread unemployment, and the distress which follows, a sincere doubt has come into the minds of many people regarding the social wisdom of material handling machinery and all devices that make for an increase in production in relation to the number of people employed.

Magazines and books on economics and social problems have much to say about technological unemployment. Some have the opinion that production machinery has been developed and used to too great an extent, and that we would all be better off if we did not have as many devices for quantity production and for the saving of labor.

As conscientious citizens, as well as manufacturers and users of material handling devices, we want to analyze these trends of thought, to be sure that we are on sound ground ethically as well as practically in manufacturing and using labor saving machinery.

Material handling devices form merely one group of labor saving devices. Machine tools form another group that has had a large influence in making quantity production possible. Agricultural implements are another. Almost every modern mechanical tool and electrical device has contributed its part to quantity production. Thus either all are wrong or all are ethically wise.

The phrase "Labor Saving" is applied more frequently to material handling devices than to machine tools or agricultural implements because common labor is replaced while the machine tool frequently replaces skilled workmen. Perhaps it is easier for the laborer to find a new opportunity than for the skilled workman. The result is the same in all cases.

Statements have been made many times during the last few years showing that the people of the United States have more material things to make them happy and to make their lives worth while, and also have more educational advantages than any other nation previously has achieved. This has been true with the shorter working hours making possible the enjoyment of these advantages. We have thought of ourselves as a nation of prosperous citizens. Something has happened to stop our prosperity. For the moment our situation is out of gear, but this does not change the fundamental reasons making possible the widespread distribution of material things and educational and social advantages.

One hundred years ago considerably more than half the people in the United States were farmers. It took more than half our population to feed themselves and to feed those engaged in other enterprises. Today about 20 per cent of our population is on the farm. With the machinery now used, that 20 per cent produces the food required for themselves and for the other 80 per cent, and has enough surplus left to demoralize prices completely. If we were to take from the farmer the mechanical equipment he now has, it would mean that we would go back to a situation where more than one-half of our people would be required to produce the food by which we all live, and we would not have people for the manu-

facture of automobiles, radios and the other things that comprise the advantages that we have enjoyed. These commodities could not then be available to the people generally. Simple arithmetic gives the answer. What we each have depends on the total made by all. The more things the one hundred and twenty million people of the United States can make, the more will be available to be divided among the one hundred and twenty million.

Our problem socially and economically today is not to reduce the number of mechanical devices, not to abandon the use and manufacture of material handling equipment, but to get our financial structure working so that the general distribution of the products from quantity production machinery will be re-established. Material handling machinery is necessary for the well being of our country.

Material Handling and Business

The next question is, how can material handling devices be used to help the re-establishment of business relations generally, on a basis that is sound and enduring, and therefore to bring back the prosperity and well being of our people.

The present entirely chaotic situation may correct itself in a number of ways. One way is for the disintegration of our general business and social structure to continue. Individuals and families will drift back to the land, so that they can produce from the land their needs, and thus continue to exist without much money and without dependence on others. If this should happen, it would mean that we would set back our civilization and our development more than one hundred years.

Another phase of the same kind of disintegration is the continued expenditure on the part of our governmental bodies of large sums out of all proportion to the income of the people and of business, with a consequent demoralization of the credit structure of our country. If this continues long enough our dollar becomes worthless and we all would start over again with nothing except our material possessions. Neither government nor individuals can continue to spend beyond what is being made, without disaster.

Another way is for business and industry to take the position in their thinking and in their practice that the present hazardous situation will not correct itself by its own momentum, and that the way out of the present situation is for business and industry to reorganize itself on the basis of its present volume, so that each business becomes a profitable enterprise, instead of a losing and dangerous venture. If it were possible today for industry and business to make a profit, so that fair wages could be paid and dividends distributed to the owners of the business, our present industrial depression would be very shortly at an end. If steps to that end are not taken, the depths reached before the turn may be great.

It is undoubtedly true that many business enterprises have been working on the philosophy that our present situation is temporary, and is bound to turn without any constructive action on their part. Such businesses have thought that their own salvation lay in continuing through this depression by getting a volume out of proportion to business generally. This volume has been secured usually by an entire disregard of actual costs of manufacture. The result of this philosophy has been a disintegration of prices of many commodities and raw materials, with large losses to the manufacturers and producers. This has not been universally true, but it has been quite generally true, and it is true that business generally is being done at a loss. Obviously this cannot be continued indefinitely, or the disintegration mentioned before will become an actual fact. There is a limit to losses. It is dangerous to wait for the turn.

A profit or loss on a business enterprise is the difference between the number of dollars that are secured for the product, and the number of dollars that are expended in the manufacture of the product. If the number of dollars secured exceeds that which is expended, the answer is a profit. When the commodity is sold so that the return is less than the actual expenditure, then the result is a loss. In many cases that loss has been of astounding proportions. To make the balance favorable, two remedies can be applied. One is to increase selling prices, the other to reduce costs.

The House of Representatives debated the question of a general sales tax. The decision was against a sales tax, but most newspapers and current magazines have indicated that the people generally consider this decision on the part of the House of Representatives unwise, and that a general sales tax was a constructive way out for the government. A general sales tax of two and a fraction per cent would, of necessity, have increased the selling price to the consumer by at least that amount, unless losses were to be increased, which is unthinkable. If such an increase in prices is wise from the standpoint of integrity of the government, it is also wise from the standpoint of the integrity of business and industry, on which the government rests. An advance in prices of 5 or 10 per cent on commodies now sold at a loss, would change business from a losing enterprise to a profit-showing enterprise, and thus in place of continuing disintegration, we would have a foundation on which we could re-establish business stability. With stability achieved, the volume of business would grow as it has from every low point. Such an advance in prices might be called a "Prosperity Boost."

No-Profit Businesses Are Slackers

Profit showing is essential to the continued stability and integrity of business and of the individual, and therefore for the country generally. There should come a general feeling among all the people that the business that deliberately conducts itself without a profit is as definitely a slacker as the individual was during the war who worked for the downfall of the country then.

Reduction of cost is nearly always possible. It is in the reduction of cost that material handling equipment can do its part. Profit is essential to the continued integrity of the country. Thus every step taken to accomplish profit is wise. The use of material handling equipment properly applied is a large element in the reduction of the cost of manufacture. It is right and proper that the manufacturers of such equipment emphasize this, and the economies that can be accomplished. The equipment should be called correctly Labor Aid Machinery, not Labor Saving Machinery. Thus there is much that we as users and manufacturers of material handling equipment can do to our common advantage, and to the advantage of the country generally. One part is to preach and practice the necessity of profit, and to extend the use of material handling equipment for that purpose. The way to prosperity is forward, not backward—forward from the present low basis by making profit now.

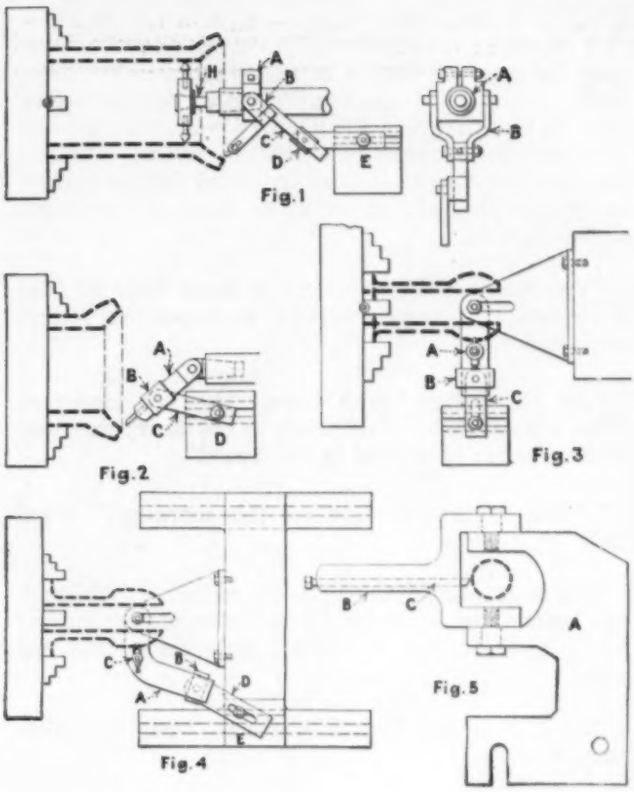
An abstract of an address before the Cincinnati Section Conference, A.S.M.E.

Facing a Concave Surface

Discussion

GEORGE ODUM

The machining of convexities is also covered by this short summary of spherical lathe operations



DEVICES similar to the one described by H. J. Dillemuth (*AM*—Vol. 76, page 25) were tried in our shop, but the results were anything but satisfactory. My experience indicates that any device which depends upon forcing the carriage in one direction or another involves too much lost motion.

Two devices that I have used successfully in machining work having concave surfaces are illustrated. In Fig. 1 is a set-up for machining a spherical seat in the enlarged end of a pipe that projects some distance from the chuck. The trunnion block *A* is clamped to the tailstock spindle, and the yoke *B* is pivoted to the trunnions. The tail of the yoke is attached to the bent radius bar *C*, at one end of which is held the tool, while the opposite end slides in the swivel block *D*. The swivel block is pivoted to a flat bar attached to the toolblock *E*. In the pipe, near the outer end, is a brass-bushed spider in which the pilot *H* is a running fit. The pilot is held in the spindle of the tailstock in place of the regular center, its purpose being to support the outboard end of the pipe.

It will be seen that with the carriage traversing toward the headstock, motion is imparted to the radius bar. The tool will be swung in an arc, machining the concavity in the end of the pipe.

In Fig. 2 is a set-up for machining a job similar to the one described by Mr. Dillemuth. Here the work does not project far enough from the chuck to require a supporting pilot. The radius bar *A* is pivoted at one end to a piece held in the tailstock spindle, the tool being held in the opposite end. Sliding on the radius bar is the swivel block *B*, which is pivoted in the end of the flat bar *C* attached to the toolblock *D*. The carriage is locked in position and movement is imparted to the radius bar by means of the cross feed.

Devices for machining convex surfaces are illustrated in Figs. 3, 4, and 5. In Fig. 3, the radius bar *A* is pivoted to a triangular support attached to the tailstock. At the opposite end is the sliding swivel block *B*, which is pivoted to the flat bar *C* attached to the toolblock. The tool post is mounted about midway of the radius bar. Motion of the radius bar is by carriage traverse.

In Fig. 4 is another set-up for machining convex work. The bent radius bar *A* is pivoted at the inner end to a triangular support attached to the carriage, and at the outer end it carries the sliding swivel block *B*, while near its center is the toolpost *C*. One end of the flat bar *D* is clamped to the toolblock *E*, while the swivel block is pivoted to the opposite end. Motion is imparted to the radius bar by traversing the carriage. In some set-ups, it may be necessary to attach the triangular support to the lathe bed or to the headstock.

An inexpensive device for machining a spherical surface on brass or other soft material that can be run at high speed is illustrated in Fig. 5. The support *A* for the radius bar *B* is attached to the side of the carriage in a vertical position. The combined radius bar and toolholder has a yoke at the inner end that is pivoted to the support by shoulder screws. The tool is held in a covered slot in the radius bar (cover not shown) and is confined by a setscrew passing through the cover at *C*. Adjustment of the tool for depth of cut is by means of the screw in the outer end of the radius bar. This device is operated by swinging the radius bar by hand.

EXECUTIVE FORUM

Personality Plus

There's no doubt that, other things being equal, we like to do business with a man whose personality pleases us. But in buying machinery things are never entirely equal. Not many years ago when equipment was bought on a large scale, a salesman's personality was likely to account for results. Have the closer purchasing policies of today reduced influence of personality as a factor in selling? If this is true, is the change permanent, or will the so-called star salesman of former days again come into his own with a revival in business? What do you think about this problem?

WALTER HOWE, sales manager of the Mid-City Machine Works, checked over the pile of reports upon his desk. A decline in sales volume was not the whole story told by the compilation of figures before him. When his friend Bill Holland was announced he welcomed the opportunity to discuss several questions that had been in the back of his mind for some time. So despite his rush of work, he asked to have Bill shown right in.

"You won't find any orders in those figures," said Bill cheerily. "There's nothing so ancient as yesterday's business."

"I'm not so sure," said Howe. "It's not done very often, I'll admit, but I still cling to the theory that past experience can be applied to the future."

"What do the figures show this morning?" asked Bill.

"Some puzzling facts," Howe replied. "Although our business is off about 50 per cent, young Phillips up in New England is doing a little better than last year."

"And I suppose Tom Humphries, your star salesman, is way off."

"Exactly," said Howe. "How did you guess? I can't understand it myself. If there's any business to be had, Humphries ought to get it. He knows every prospect by his first name and always has the inside track. Phillips is a big surprise. When he came with the company two years ago I was very doubtful about taking him on at all. He seemed to lack sales personality."

"You've almost answered your own question," said Bill. "The personality salesman is falling down and the quiet plugger is making sales. Among the many things that have been deflated by this depression is sales personality. Machines aren't sold today with a slap on the back or a round of golf. When things were moving fast, the face with the smile got the order. Now buyers demand more than good humor—they want detailed facts and figures."

"Humphries has just as many facts and figures as Phillips," said Howe. "Both men work to the same specifications and the same price list. Any difference should be in Humphries' favor because his long experience has made him familiar with all the details of our designs."

"But he has never sold with details," said Bill. "That's not his natural method. He's probably making more effort to get sales than ever, but the customers are not responding to his form of attack. Young Phillips, having no unusual personality to rely on, has learned the line and how to present it on a dollars-and-cents basis. He proves to the prospects that they should buy not because they like him but because it is to their own advantage."

"You fail to take into account the many other variables," said Howe. "There's quite a marked variation in business activity in different sections of the country."

"I appreciate that," said Bill, "but this isn't the first example I've seen."

"Then you think that Phillips' success is due to conditions," said Howe. "That his method conforms to the super-critical attitude of purchasers today? If that's the case, Humphries' tactics will again become effective when things loosen up."

"I question that," said Bill. "Personality salesmen thrive best in fair weather, it's true. But I believe that they'll never be the factor in business they were a few years ago."

Discussions Of Former Subjects

New Brooms

In a properly organized shop, the shake-up method of stimulating efficiency would have no place. Slack periods, insteading of serving as an excuse for settling into a rut, are seized upon as an opportunity for checking up on equipment and improving plant efficiency wherever possible. Having had an opportunity to see the shake-up method, as practiced in one large organization, directly responsible for a loss of several thousand dollars, I must record my vote as opposed.

It is wrong in principle to disrupt a smooth-running organization which has taken years to build. The chances of uncovering replacement timber of the proper grade are slim in comparison to the costly adjustment period required. —ROBERT S. ALEXANDER.

Iron and Gold

As modern manufacture is based on the unit system of production, it seems natural that the cost basis should be arranged on the same lines. The several departments concerned with production should have a separate unit percentage of burden worked out, to be allocated as a charge on the production. This burden should take into account only those charges of overhead related directly as proportionate to each department. Light, heat, and power would be allocated according to cubic contents of the space used, and the amount of horsepower, or units of energy consumed. Administration and management burden would be allocated in proportion to the department's own overhead, in relation to the other departments on a prorated unit basis.

If the department, to function efficiently, needed a considerable supervision cost, the general burden rate would be high, and vice versa. The engineering department, if efficient, renders service to the pattern shop and foundry, and therefore these departments as well as the machine shop should share the burden. With regard to the selling department's costs being charged to production burden, I hardly think this procedure fair. The burden of the selling department should be prorated according to the volume of sales, and therefore would be low, if the sales were high. This basis of charging costs means that all salaries would become some sort of burden and should be charged proportionately only to the department which uses their services. On patterns, which are always for something new and therefore imply an improvement in the article made, the charge would be fairly allocated over the first lot.—ARTHUR BRAMWELL.

Shifting the Burden

If I were an employer, I would arrange my plant so the desired output would be gained by running four five-hour shifts. I have found that work people produced as much when working five hours at top pressure as when working eight hours. Continual night work is no good for the health of the worker, so that from the point of view of the most good for the majority, shift work should not be employed. There is no need for any industry to do without the latest machinery when so many people are out of work who could produce that machinery.

Shift work, or any other newfangled idea, is useless unless the whole of industry is controlled and worked as a unit, instead of like a hive of bad tempered bees, stinging and strangling one another.

—HARRY SHAW,
Tool and Gear Consultant, Lancashire, England.

Dominant or Dumb?

If the policy of dominancy is carried beyond reasonable limits, it has the effect of curtailing the initiative of employees, especially those who are easily discouraged. On the other hand, if the employer remains dumb, and lets things drift according to the will of the employees, he would not get far away from the red side of the ledger.

Somewhere back of all the conflict and interchange of ideas, there is usually found some one man who is responsible for the success of the business. In some cases, there is more than one man, say, a man at the head of each department. But in all cases, where the business is successful, the duty of making final decisions works its way back to the person at the head of it. He may delegate this duty by remaining dumb in the presence of discussion; but if he does, he is running the risk of improper decisions or no decisions at all. The employer has the world from which to choose in his collection of experience, so why not admit that he is the power behind the machine? Most people like to work for a man who knows what he wants and knows that he knows.

Every employee should be given a chance to express his true convictions and should be shown the utmost respect even though his ideas or proposals may not be acceptable. The happiest combination is the median line between the two extremes, namely, to dominate without seeming to domineer and to listen without seeming like a timid soul.

—GLEN MACOMBER.

Self-Contained

Certainly most small organizations cannot afford the necessary machinery and men to make tools accurately or economically. While they wait for the tool production of their own small, slow, auxiliary service, they lose still more money, whereas the big contractor with far greater resources of men and machinery, in quantity and quality, and with wider experience, can make his own profit, and also save his customers time and money.

The contractor can specialize and subdivide his work according to individual capacity. He may have the finest skill, and keep it solely employed on appropriate work. He can buy the best machinery and the ablest and most experienced supervision. His greater field of service warrants it and makes it profitable.

What is economical for a company situated in a big industrial community will not be for an organization far removed from such a location. However, even the remote organization would probably find it profitable to contract out the manufacture of its tools and keep only enough toolmakers for their maintenance.

—JOHN J. WOFFINGTON,
Lenton, England.

■ Right — This machine is capable of making end measurements on pieces up to 40 in. long precise to 0.00001 in. The part to be measured is laid on two adjustable supports in the center. End attachments are brought into contact, the one at right being adjusted to a definite pressure. The other carries a 20-in. graduated scale. Two microscopes on fixed supports are used to read the scale, one for pieces shorter than 20 in., the other for pieces longer. Measurement is made by comparison of readings with those made on standards of about the same length as the test piece, the difference between readings being added to or subtracted from gage block length to obtain the true length of the test piece

■ Left — Originally designed for determining positions of celestial bodies on astronomical photographs, this star comparator has been adapted to read any dimension over an area of 400 sq.cm. to one micron—about 0.00004 in. A microscope on a sliding carriage moves across the bed, while the part-carrying table may be moved up or down or at any angle

■ Below — End measurements to an accuracy of 0.00001 in. on parts of limited length may be made with this optimeter. The grid-like baseplate minimizes dust effects. The upper surface is a ball-point feeler with total possible movement of 0.010 in. Its travel is magnified 780 times and read on an illuminated scale. Gage blocks are used with pieces thicker than 0.01 in.

Optics Applied to Gage Inspection

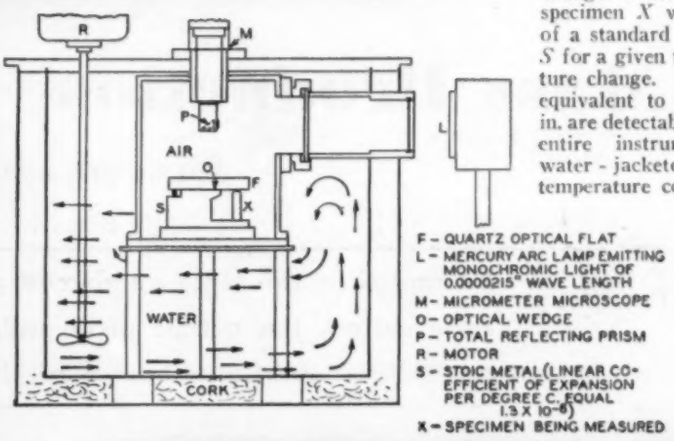
Interchangeability of telephone parts is assured by manufacturing them to close tolerances. This requires still closer tolerances on gages, even closer tolerances on the instruments that check the gages. A part held to 0.001 in. requires a gage held to 0.0001 and a checking instrument accurate to 0.00001 in. Here is pictured some of the equipment of the Precision Measurements Laboratory, Bell Laboratories

Photographs courtesy Bell Laboratories Record

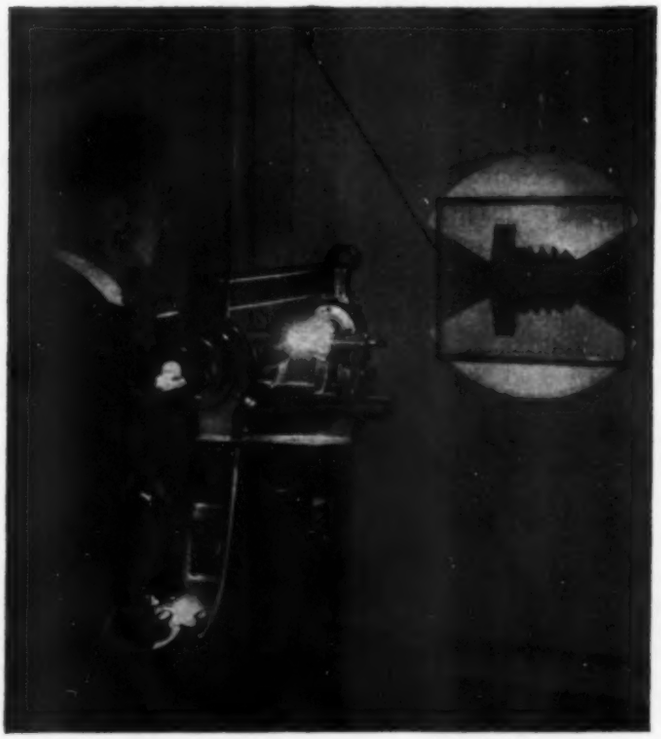
■ Line measurements may also be made with this line comparator, here shown in use for comparing dimensions of a rack used on panel selectors with a standard H-shaped yard. To measure the distance between slots on the rack, the two microscopes are moved along guides on the machine frame until their cross-hairs are accurately over two points on the slots. Then the carriage, on which both the rack and the standard yard are mounted, is moved forward until the lines of the standard may be observed by the microscopes and a direct comparison made

■ Above—Interferometers are used for measurements of small lengths or changes in lengths. This large-field interferometer, with a field 3 in. in diameter, was specially built for measuring variations in flatness or parallelism of lapped and polished surfaces such as the back plate of a condenser transmitter. The flat surface of a quartz optical flat is placed over the surface to be examined, and illumination shows interference fringes where the surfaces do not agree. These permit measurements to 0.000005 in.

■ Schematic arrangement of a micro-interferometer used for determining temperature coefficients of expansion and observing small changes in length. It compares the changes in length of a specimen *X* with that of a standard material *S* for a given temperature change. Changes equivalent to 0.000001 in. are detectable. The entire instrument is water-jacketed for temperature control



■ The large variety of parts used in telephone apparatus, each with its own shape, requires much contour measuring. A commercial screw-thread contour projector was adapted for the purpose, its lenses being replaced by the most perfect lenses obtainable from optical suppliers. This unit, together with the others, is kept in a room in which temperature is maintained constantly at 68 deg. F. by air-conditioning equipment which also removes dust that might collect on gages. The room is carefully shielded from all exterior vibrations



JAMES R. CORNELIUS
Consulting Engineer,
Coventry, England

Metal Rolling in Mass Production

Discussion

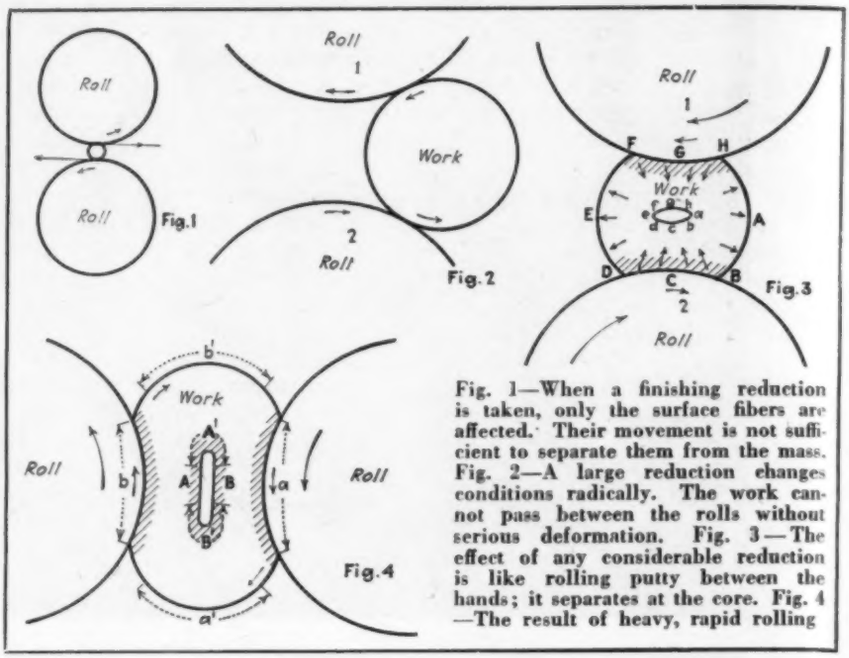


Fig. 1—When a finishing reduction is taken, only the surface fibers are affected. Their movement is not sufficient to separate them from the mass. Fig. 2—A large reduction changes conditions radically. The work cannot pass between the rolls without serious deformation. Fig. 3—The effect of any considerable reduction is like rolling putty between the hands; it separates at the core. Fig. 4—The result of heavy, rapid rolling

Prompted by the large number of requests for further information, the author gives additional facts on the possibilities and limitations of machine rolling of metal

PRIMARILY, all the rolling machines illustrated and described in my previous article (*AM*—Vol. 76, page 2) were purely and simply cold rolling machines. None of the operations were performed hot. Since hot rolling also entered into the questionnaires sent me regarding the machines, I have included a short description of this procedure.

When considering the cold rolling of any work, it must be remembered that whereas metal can be reduced in diameter by using cutting machines, such as lathes, from the original diameter to zero diameter, there are specific limits on the total reduction of diameter that can be obtained by rolling. This reduction represents a large percentage of the original diameter on small work, but when larger stock is considered the percentage becomes small. A pin with a diameter of 0.250 in. can easily be reduced by rolling to 0.180 in. along certain portions of its length. This represents over 25 per cent of the diameter. To attempt such a reduction with a 2-in. shaft is out of the question. It may be accepted that the total reduction of diameter is a fairly constant figure for each class of metal of identical properties, so long as the area imposed upon remains in constant proportion with the power absorbed.

In this respect the rolling machine is closely allied to the grinding machine. In both, the bigger the stock, assuming that the abrasive wheels, or rolls are kept at a constant diameter, the bigger the area in contact and the greater the power required to effect either the removal of metal by the wheel, or the reduction of the diameter by the rolls.

Rolling machines cannot be used as roughing machines to prepare work for subsequent operations. They are finishing machines of the most accurate type. It will be evident from the foregoing that the cold rolling machine is more applicable to finishing much of the work that is performed on such machines as finishing lathes, polishing machines, grinding machines and automatic lathes.

A few examples might be apropos here. A well known railroad employs a set of three rollers to finish the journals of its engine and coach axles. These are mounted on a special fixture on the lathe face plate and revolved round the journal producing a smooth finish together with a compressed surface that is found to resist wear at least twice as long as when the journals were simply turned and polished. Another firm producing leader pins for die-sets rolls its pins after carburizing and before quenching and grinding; it finds that the case is more compact than when simply casehardened and ground. Gear wheels for automobiles are rolled by one firm before and after heat-treatment; the flanks of the teeth are found to be much denser when prepared thus.

When too great a reduction of diameter is attempted,

the metal will invariably break down in exactly the same way as any other type of fatigue will affect a metal. It is advisable therefore, when adopting this method of finishing, to cut the time of the operation as short as possible. This is also necessary with metals that have a tendency to workharden. I have known copper, for instance, to ruin several rolls before the cause was discovered to be that the speed was too low. The machine employed was a twin roller used alternately for steel and copper pins. The speed of the machine was not altered and the rolls used for copper lasted only one quarter of the time that those for steel pins did. An increase in the roll speed, of approximately 300 per cent for the copper pins, rectified this trouble.

When considering work for the rolling machine, the

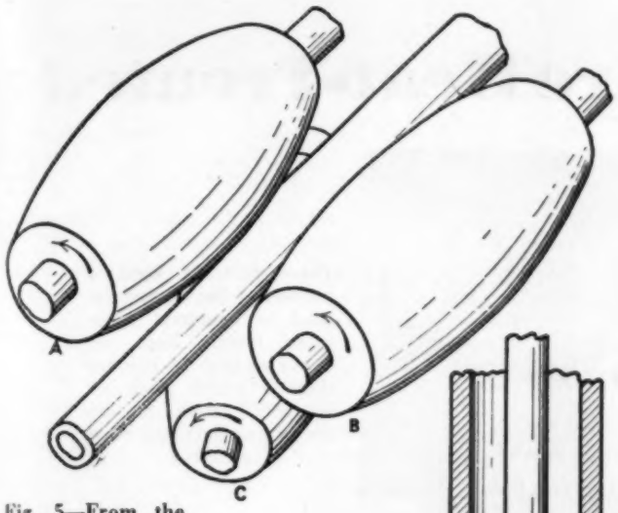


Fig. 5—From the separating or piping action when rolled, the process of making seamless tubing evolved. Linear speed 7,200 ft./min., 9,000 hp.

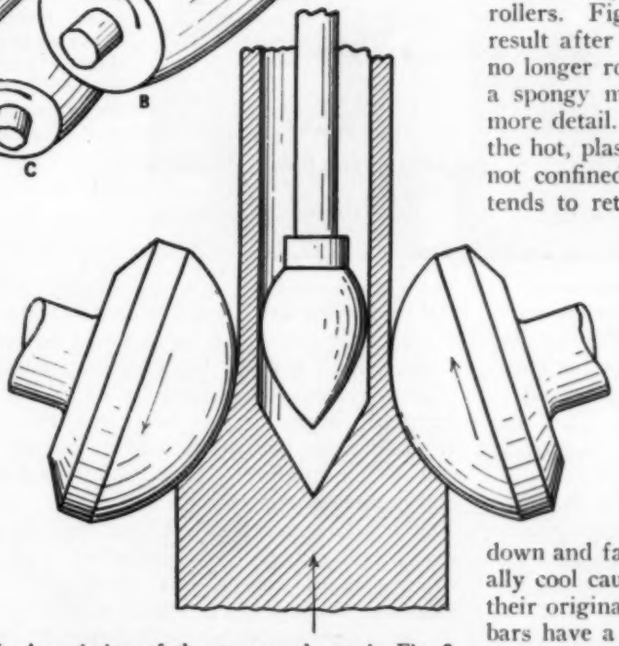


Fig. 6—A variation of the process shown in Fig. 2 used in France. In England we sometimes use a mandrel with the rolls shown in Fig. 5, particularly so, with copper

question of direction of grain must be taken into account. It cannot be expected that two parts will be identical when produced on the rolling machine, if the direction of their grain differs. Examples of this will be found in Figs. 2, 3, and 4 of my first article (*AM*—Vol. 76, page 3). All these parts were produced from sheet metal blanks. The machine made for the wheel blank shown in Fig. 3 was condemned as a failure by the foreman of the machine shop when first made. He had no instructions as to what material was to be employed for these wheels and turned up the blanks from bar stock. He took several blanks and attempted to roll them, with drastic results to both blanks and rollers. The grain in the sheet is parallel with the faces of the blank, whereas those in the bar stock are parallel with its length. The former can be bent without being broken, the latter will be sheared unless they are ductile enough to stretch sufficiently.

Several words concerning hot rolling. Hot rolling cannot be applied to the fabrication of round stock with any great success. In this respect, the cold rolling process may be likened to using the drop hammer in the manufacture of heavy forgings. A drop hammer, of let us assume, 1,000 pounds deadweight, will give a heavy blow to an ingot 36 in. diameter, but will only deform the exterior. The blow will not reach the heart of the ingot. There will, therefore, be a gradually diminishing flow of metal as the effect approaches the center. If we use the size of ingot that would allow the drop hammer to have effect right to the heart of the metal, and at the same time rotate the ingot between each blow, we would find, if we kept on forging until the metal was chilled, that we had produced a forging that was spongy or hollow in the center.

The same phenomenon occurs when trying to hot roll heavy stock. If only a light pass is taken, the job goes through as in Fig. 1, but when hot work is rolled, it is always with the intention of rapidly reducing the diameter, as shown in Fig. 2. The diameter of the job is considerably in excess of the aperture between the two rollers. Fig. 3 shows, somewhat out of proportion, the result after several revolutions of the rolls. The bar is no longer round in section, and there is either a pipe or a spongy mass in the center. Fig. 4 explains this in more detail. Here, we have the two rollers compressing the hot, plastic metal. This metal bulges out where it is not confined, while the cohesion between the molecules tends to retain the original shape. We thus have two forces acting, one pushing the sides b' and a' from each other and tearing apart the molecules A' from those B', the other forcing the molecules A and B together and pressing the sides a and b inwards. In a fraction of a second, the positions are reversed. The sides a and b are occupying the positions previously held by a' and b', while the molecules in the core have been slipping and sliding over each other, and continually occupying each others places. Cohesion is broken down and fatigue set in, while the outer molecules gradually cool causing those inside greater difficulty to occupy their original positions. For these reasons, all hot rolled bars have a tendency to be spongy in the center if they are substantially reduced in diameter.

From this natural action in a bar of steel, has emanated the Mannesmann process for the manufacture of seamless tubes. This method of rolling permits, without the use of a central mandrel, the production of an open and seamless tube by helical rolling from the round ingot. The apparatus consists of three rollers the forms of which are hyperbolical. Two of these are mounted on parallel shafts whilst the third is mounted obliquely across the central plane as shown in Fig. 5. All three rotate in the same direction and have grooves cut in their peripheries similar to coarse screw threads. The object of these is to carry the bar forward as soon as it is engaged. These rollers are rotated at a speed of from 6,000 to 8,000 ft. per min., requiring an expendi-

ture of up to 10,000 hp. for rolling a 6 in. tube 12 ft. long.

The rapidity of the operation may be grasped when it is known that a billet is reduced to 4 in. diameter and 20 ft. long with a 1-in. hole right through in less than 45 seconds with an expenditure of 9,000 horsepower.

The explanation is given as follows: (1) The bloom, being grasped by means of the rollers is submitted to a forward pressure in an oblique direction that effects only the superficial fibers, lengthening them and thus forming a cup. (2) The enormous pressure of the rollers, together with their speed causes the central fibres to rupture. Owing to the high temperature here, the action is accentuated. (3) The high speed sets up a considerable centrifugal action that forces the plastic center fibers outwards after rupture, the action of the rollers tends to cool the exterior.

It is noted that during this operation considerable quantities of hydrogen and azote are liberated and have been found in the tubes, proving no doubt the presence of these gases in the metal. Further reductions are obtained on the drawbench.

From this process was evolved that employed by the S. A. Escaut et Meuse at Anzin, France, illustrated in Fig. 6. Here, but two rollers are used, but they are used end-on to give the same action as if three were in use. The bar is guided through the rollers, and to insure a round bore the mandrel shown is fitted.

Where Small Tools Are Heat-Treated

These furnaces form a portion of the equipment used to heat-treat high-speed tools. Note the sleeve around the column through which fresh air is forced close to the floor line where it is most effective

BECAUSE the tool is the limiting factor in most machining problems, metal-working progress has gone hand in hand with the development of better tools. What the cutting edge of the small tool will stand is the primary basis of machine tool design. The tool manufacturer must be constantly on the alert to provide for industry's demands for faster and heavier cuts.

Though the composition of high-speed steel has varied but little in recent years, the product has been greatly improved through better means of manufacture and better methods of producing tools from it. The wide use of the electric furnace in making high-speed steel has effected close temperature control and mathematical exactness in obtaining a predetermined chemical analysis. To preserve to the fullest degree this refinement of material in the finished product, skillful design and careful heat-treatment are essential.

This last need has been met by the Union Twist Drill Company by a new hardening room annexed to its Athol, Mass., plant. The department combines the functions of two sections, both of which formerly handled heat-treatment independently. The latest in heat-treating equipment has been installed, and a new wing added to the plant to house it. The dark, crowded appearance too frequently found in older hardening rooms has been avoided by ample space and efficient ventilating.

The accompanying views illustrate the spaciousness of this department, the convenient grouping of equipment and numerous work benches to facilitate work handling.

Fresh air enters the room under forced draft through sleeves, built around the building columns. This ventilating system has a capacity of 24,000 cubic feet per minute. Smoke and fumes are exhausted through the furnace hoods by fans located in the stair wells at either end of the building. Thus the atmosphere is kept clean and cool at all times.

This plant manufactures twist drills, cutters and reamers, which range in size from tiny twist drills for machining holes only a few thousandths of an inch in diameter to the large hob illustrated, which was designed to cut gear segments for bascule bridges. The tools vary in weight from a fraction of an ounce to some 700 lb. The wide range in size and design of the product naturally complicates the problem of heat-treatment. Carbon steel is used to a considerable extent for small drills and reamers. The balance of the tools are either entirely of high-speed steel or have high-speed cutting edges. Large cutters are usually made with inserted teeth. Large twist drills use alloy steel shanks flash welded to the high-speed fluted ends. Upon its receipt material used for the manufacture of tools is carefully inspected and tested.

Heat-treating practice is built upon years of experience in the manufacture of tools. So varied is the effect of temperature and time upon tools of different sizes and designs that it is impossible to establish fixed rules

Quenching baths and work tables are placed conveniently near these electric lead pots. In the corner may be seen two furnaces for treating unusually large tools

for hardening. As each lot of tools is completed, the process used is recorded together with the results of the physical tests. These records are filed and are used to fix the heat-treatment of future lots of the same design.

The heat-treating department includes three rooms, one for hardening, one for pickling, and one for sand-blasting. A corner of the sand-blast room is used for inspection of all tools heat-treated.

High-speed tools are brought to the correct temperature in both preheating and final heat. The time of heating, as well as the temperature, is determined by the type and design of the tool to be treated. Tools are quenched in a special oil and drawn to the proper temper. All furnaces are equipped with the most modern temperature control instruments.

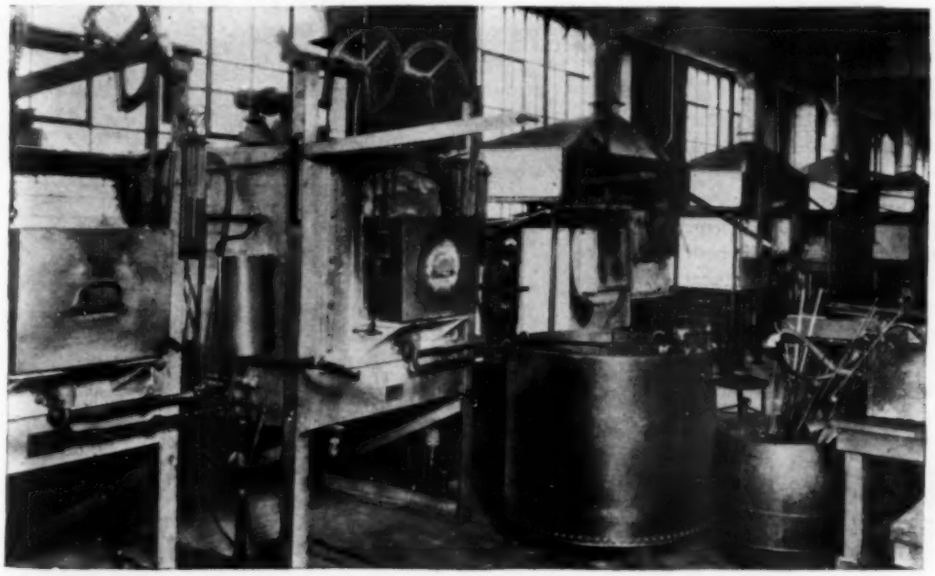
Oil quenching tanks are located conveniently near each pair of high-speed furnaces. The furnaces for carbon steel and lead pots are provided with brine tanks. Circulating systems keep both the oil and brine at constant temperature.

The pickling room contains two hot soda baths and two muriatic acid pickling tanks. These remove the quenching oils and loosen the scale on the tools after heat-treatment. Final cleaning is done by sand-blasting.

Tools are tested for hardness by the Rockwell method and by the use of testing files. When necessary, tools are straightened under a press after heating with a gas flame controlled by a foot treadle which keeps both the operator's hands free. It requires judgment and skill to straighten the tool quickly and with a minimum of heating.

Some idea of the wide variety of work handled may be gained from these two hobs. Shape, material and size have a direct effect on the heat-treatment used

The reputation for quality which the product of the Union Twist Drill Company enjoys is attributable to close attention to detail. Each step in heat-treatment is carefully planned and executed. The new heat-treating department will make this service increasingly effective.



Automatically controlled furnaces, some oil and some electrically heated, are arranged in pairs for the preheat and final heat of high-speed steel

Making and Keeping Crankpins

An ever-present problem of locomotive maintenance is discussed by two men experienced in the field

C. G. WILLIAMS

IN THE first paragraph of the article under the above title (*AM*—Vol. 76, page 819), it is stated: "Few of the present-day shop men remember when worn pins were rounded up and brought into line with a file." Many is the time that I have sat alongside a pit in a roundhouse or back shop and filed for days on a set of pins that had been allowed to wear $\frac{1}{16}$ to $\frac{1}{8}$ in. out of round, and tapered sometimes a like amount.

For years I have been trying to talk railroad officials into a state of mind where they would authorize pins to be reconditioned before they became worn to any great extent, for in this way they could save thousands of dollars in the course of a year. By the very nature, location and shape of the pins, they will wear more on two sides, and will wear tapered. If this condition were remedied when the pin had worn but a few thousandths of an inch, the life of the brasses would be at least doubled. Generally speaking, the pins are not conditioned until the locomotive needs a general overhaul, although by that time they may be out of round as much as an eighth of an inch. It is true that the use of the floating bushing has eliminated to a great extent the flat-sided pin that was so prevalent on the old time locomotive, but this condition could be eliminated to a greater extent if portable machines were placed in each roundhouse to remove any out-of-roundness in a crankpin each time a floating bushing was renewed. Nothing will wear a bushing so fast as an out-of-round pin. After a pin has begun to wear, each succeeding renewal of the bushing causes both the pin and the bushing to wear faster.

There is now on the market a portable grinding machine for this type of work, and a new portable machine has been designed to bring honing into use in the railroad shop and roundhouse as a means of reconditioning these pins. Honing will remove metal faster and give a better finish for wear than will the grinding wheel. This external honing machine can be set up in ten minutes and in another ten minutes will remove 0.035 in. of metal from a 10 in. diameter pin, bringing it true and round to within 0.0005 in. It is true that these new machines would need to be purchased, but their cost would be repaid many times yearly in savings in labor, materials and fuel.

When with one of our railroads, I tried to remedy the tapered pin trouble by truing them on a quartering machine, but the truing attachment was so badly designed that the spring of the tool attachment gave us pins $\frac{1}{16}$ in. taper, even when several cuts were taken. We tried to remedy this weakness by welding an extra rib to the back of the attachment, also by welding an extension sleeve to the attachment where it was clamped to the boring bar, but the spring could not be entirely eliminated.

Another ailment of main pins especially, but known to exist in nearly all locomotive crank pins, is their out-of-parallelism. Some of this is caused by the nature of the work required of them, but much of it is the result of wrong manipulation at the hydraulic press. Experience on the above mentioned railroad and on another railroad as gang-foreman of the link bench, has proven to me that the tapered fit is not a cure, but on the contrary, is a prolific source of loose pins. In such cases, riveting over the end of the pin does not do much good. When a taper pin is applied with a pressure of around 100 tons, the metal around the pin hole is displaced and acquires a permanent set. With the steel generally used in wheel centers, it requires but approximately 50,000 lb. per sq.in. pressure to compress and give a permanent set to the steel, so that there will be but slight, if any, elasticity in the metal for recovery. With a tapered fit pin, it will require but a slight amount of "work" on the pin to cause it to back up an amount that will leave it virtually loose. In many cases, it is only the metal displaced in riveting the pin in place that keeps it from loosening up to a dangerous degree. After a short time of operation with the force applied alternately to each side of the pin, it will show up as loose and must be replaced. This condition is applicable to all pins but more especially to the main pins.

When shop inspector on one railroad, I found that main pins were as much as $\frac{1}{8}$ in. out of line at the outer end when pressed into the wheel center. This road had been using the tapered fit, but had changed back to the straight fit as giving the best results. Investigation of methods of applying the pin showed that they were started in the wheel center in an out-of-line position. To remedy this, we made a special pin holder that was applied to the outer end of the hydraulic press ram. This fixture had a spring center strong enough to hold up the outer end of the pin, while a four-jaw centering chuck held the weight of the pin and lined it up in position. In this way, we could hold the pin to 0.005 in. out of line. It could be done in no other way. We were also obligated to locate the wheel center so that the hole was in line with the axis of the pin, for otherwise we were not sure that the pin would be true. When pressure was applied to the pin and the wheel center forced against the press yoke, it would not adjust itself, nor could it be conveniently shifted. This way took a little longer to complete the job, but it guaranteed less trouble for the future.

There is yet another condition on the railroads that should be remedied, as it is costing them much money, not in the shops for it doesn't show up there except as a condition to be remedied. This is the wear in the

locomotive cylinders from the sliding action of the piston and the piston rings. This wear has been known to multiply until the cylinder was $\frac{3}{16}$ in. out of round when taken to the shop for a complete overhaul. As a general thing, the cylinders will not be rebored if they are not worn more than $\frac{1}{16}$ in. In some shops, it is the practice to block up the locomotive over the pit by placing the blocking under the cylinders and allowing the weight of the frames and boiler to be carried by the cylinders, and while in this condition, to measure the cylinders for wear. In one shop where I worked, one of the largest locomotives on the road was sent out of the shop with the cylinders $\frac{7}{32}$ in. out of round. It had been reconditioned by boring, but the spring in those 30-in. cylinders as they sat on the blocking being bored was such as to leave them in this condition. In the trial run, the condition showed up as a "blow" of steam through the cylinder from boiler to atmosphere. It was necessary to replace the cylinder bushings as they would not stand a second rebore.

Generally speaking, considering what can be done, the actual reconditioning of crankpins and locomotive cylinders is as far behind the times as Maudsley's practice was behind today's practice. Maudsley's cylinder was $\frac{3}{8}$ in. out of round and he developed the first cylinder boring machine to eliminate this condition.

FRANCIS W. SHAW
Tool and Gear Consultant,
Heywood, England

THE TREND in manufacturing is to transfer the onus of accuracy of product from man to machine. A machine is made but once, the product continuously. Crankpin misalignment will remain a serious problem so long as railroad executives are oblivious to the economic factors behind the trend.

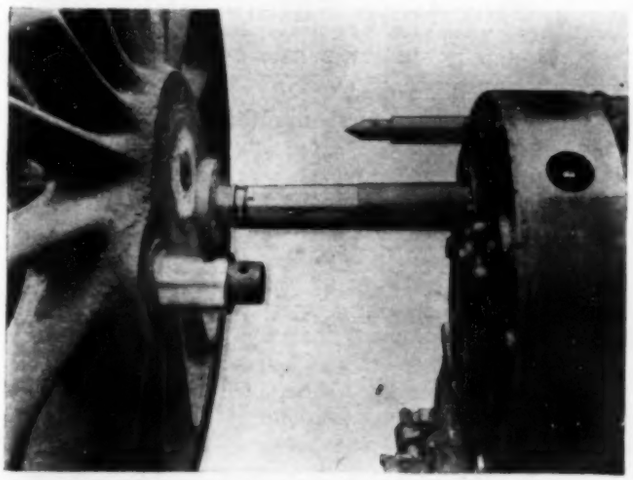


Fig. 1—The grinding head is designed to grind up to a shoulder. The centralizing bar is seen above

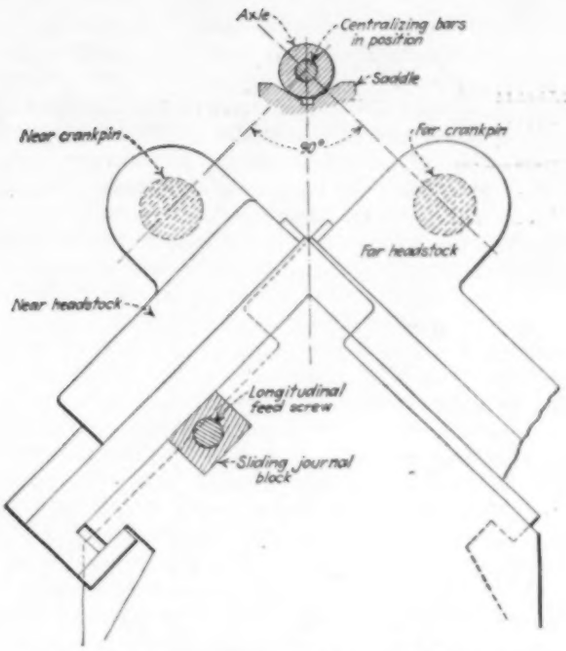


Fig. 2—This arrangement of saddle and slides automatically quarters a pair of wheels

In locomotive crankpins, security and successful operation depends upon accuracy and tightness of the pins in the wheel centers, parallelism between the axis of pins and axle, accurate quartering, lack of taper in the pins themselves, and the fit between them and the connecting rod bushings. Whether the fit of pins to wheels be parallel or tapered, it is certain that for a given force fit, the more intimate the contact between pins and hole, the greater will be the resistance to those forces that tend to loosen the pins. Such intimacy can best be secured by grinding both pins and holes in a manner to be described.

The final accuracy is likely to be enhanced if the holes in the wheels are finished to size after the wheel centers have been forced on the axle.

With all these points in mind, a quartering machine was designed by John Holroyd & Co., Limited, of Milnrow, near Rochdale, England. In this machine, the accuracy of the quartering is quite independent of the operator, and the accuracy of throw almost so. Accuracy of the crankpin holes in the wheels, whether these are tapered or parallel, and of the crankpins themselves, depends upon the initial accuracy of the headstock equipment and accuracy in the alignment of the various slides of the machine. The attainment of diameter accuracy is, however, still dependent upon the operator.

The machine is of duplex construction, each unit being self-contained, so that the operator, having set one tool in operation on one hole or pin, can transfer his attention to these elements of the other wheel. Two centralizing bars sliding endwise in brackets, one on each headstock, are in line with the basic center line of the machine when the headstocks are in their lowest position upon the angular cross slides which are set to each other at an angle of 90 deg. The axes of the headstock spindles are located on lines at 90 deg. to

each other. Consequently, after the wheel axle has been centralized in the saddle by the bars, the headstock spindles are adjusted to the desired crank throw. If now the axle be rotated until the centers of the crankpins, as denoted by their center marks, lie in the angular lines of travel, whatever be the throw, the crankpins will have been duly quartered, the accuracy of quartering depending solely upon the accuracy of the machine and the accuracy of the adjustment of the axle to the centralizing bars, this latter being quite a simple matter. To insure the correctness of the rotary adjustment, the center marks of the crankpins are brought into line with centers attached to the headstock spindles and concentric therewith. The adjustment for crank throw is controlled by gage blocks of the throw dimension.

Of particular interest is the arrangement of the feed-screw reversing motion. As is well known, to grind up to a shoulder demands a definite reverse. In this machine, it is only necessary to set a stop at each end of the travel to insure definite travel distances which cannot possibly be overrun. The reversing action is this: Immediately the tool slide makes contact with a fixed stop, the screw, instead of feeding the slide, begins to pull at the screw journal block, which is carried in guides, and moves it endwise. In its endwise movement the block through a level operates a device of the usual type and ultimately causes the clutch to reverse. The journal block is held in mid position by weights suspended from two levers. As the block moves endwise in one direction, it lifts one set of weights; moving in the other direction, it lifts the other set. Either set of weights in falling returns the journal block to mid-position. The time occupied in the movement of the block allows for a dwell at each end of a shouldered crankpin or one with a shoulder at each end.

• NEXT WEEK •

Large diameters and bores should have two sets of tolerances—one for the shop and one for the customer. This suggestion is one of many made by Prof. N. N. Sawin, European standards authority, in an article, "Tolerances for Large Diameters."

A conveyor installation, so laid out that though the speed is constant, each step in the finishing process is apportioned its proper time cycle, will be described. This set-up is used in the Ford plant at Long Beach, Calif.

Sam Trimbath outlines the relation between backlash and pin measurement in gear teeth. Walter Wells tells of a progressive die for manufacturing conduit cleats. W. C. Betz describes a method of laying out cams for automatic screw machines. "Shops of the Philippines" is full of human interest since it contains an account of the native workman's habits and philosophy.

• IN A. M. •

Cracks in Driving Axles
Discussion

J. T. TOWLSON
London, England

REFERRING to the article under the title given above (*AM*—Vol. 75, page 961), it happens that as an outcome of experience as a maintenance man, I am fully able to agree with the particular foreman referred to in the text, who is beginning to experiment with keyways having substantial fillets in the corners.

For many years, I experimented in eliminating sharp corners wherever found, outside as well as inside. There is no doubt that the number of disasters that have had their origin in sharp corners is quite sufficient to make us take notice and to avoid them.

I have known large cast-iron crank disks on steam engines to crack as the result of the heating of an adjacent journal, and the crack has always originated from sharp corners in the keyways. Replacements with appreciable fillets in the keyways have prevented a break, nothwithstanding the heating of the adjacent bearing.

Another example that steam engineers will be fully familiar with: The exhaust ports of a steam cylinder. The fitters have expended valuable time in making the corners sharp and all to less than no purpose. This not only invites deeply-scored lines along the ported face, but asks for them in the shape of cracks that may become extended.

It is surprising to me that engineers who on seeing a crack in a casting, a boiler plate, or a sheet of glass, will drill a hole at the end of the crack as a sure preventive of its extension, will pass and even design parts having destructive corners galore; and this in cases where the corners could have been filleted satisfactorily with the probability of a crack eliminated.

In all featherways in shafts from 1 to 12 in., it has been my rule for years to provide a radius at the bottom, its extent being generally one-quarter of the thickness of the feather. Notwithstanding this extra depth, tests to destruction have shown that it is not so productive of evil effects as the traditionally sharp corners in a less deep featherway.

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The Shop Philosopher

MATTHEW HARRIS

ABOUT the time the *American Machinist* made its initial bow to the mechanical public I was a young journeyman—and a cocky one at that, because I was being paid the top wage for machinists at that time. But "Pride goeth before a fall," for hard times had struck the shop and the wages were cut ten per cent, and some of the men were let go.

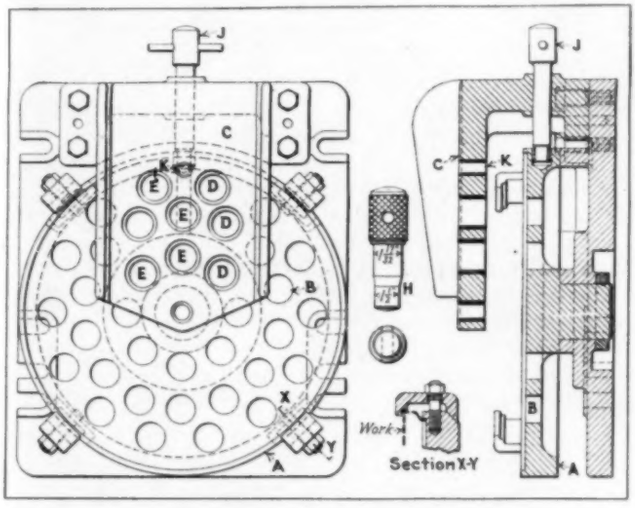
During the noon hour on the day the cut in wages was announced, several of us who had finished our lunches and lighted our "dudeens" gathered around the stove to discuss matters and bemoan our fate. An old German, John Lunk by name, had listened to all that was said, but had vouchsafed no opinion. Finally, just as the one-o'clock whistle blew, and we were starting back to work, old John said, "Vell poys, vat d'hell is de use to growl? Dere's von satisfaction anyvay; ven ve lose a day ve don't lose so much monish."

IDEAS from PRACTICAL MEN

An Indexing Jig for Drilling Condenser-Tube Sheets

CHARLES C. TOMNEY
Chief Tool Designer, Brunswick-Kroeschell Company

THE tube sheets for our condensers require 36 1½-in. holes drilled for the tubes and 15 drilled and tapped for ⅜-in. pipe. The work is done in the indexing jig illustrated. We formerly used a jig that had a bushing plate with as many bushings as there were holes to be drilled. While a jig of this type worked out nicely in a



radial drill, it was hard on the operator when used in an ordinary drill because he had to move the jig for every hole. Since it did not pay to hold up a large radial drill for this class of work nor to use a jig of the former type in an ordinary drill, I designed the indexing jig illustrated. While its cost was more than that of the former jig, the extra cost was saved in about six months.

The base of the jig is slotted on both sides to match the T-slots in two different drill-press tables, both of which are universal, and we try to keep the job on these machines. The base of the jig is bored in the center to receive the hub of the revolving work holder *A*, being kept in position by a collar. Clearance holes *B*, $\frac{1}{16}$ in. larger than the drilled holes in the tube sheet, are drilled through the work holder to match the tube sheet.

The bushing plate *C* is bolted and doweled to the base, as shown. Bushings *D* are each 1½ in. inside diameter, while bushings *E* are 1$\frac{13}{32}$ in. inside diameter to fit the large diameter of the index pin *H*. The small end of the indexing pin is a slip fit in the 1½-in. drilled holes. A ½-in. hole is drilled through the knurled part of the pin for a handle. The reason for making the bushings *E* larger than bushings *D* is to permit the slight taper on the indexing pin to take care of a few thousandths difference in the diameter of the drilled holes. When the indexing pin is inserted, the tapered portion will automatically center the holes, regardless of a slight variation in their size.

After the work has been clamped in position, the clearance holes in the work holder are hidden from view, and in order that the first hole in each circle in the tube sheet will match its clearance hole in the work holder, the plug *J* is inserted through the back of the bushing plate and into a bushing in the work holder. This plug is used only when starting the first hole in each circle. After the first hole in one circle has been drilled, the work and the work holder are revolved, and the indexing pin *H* is inserted in the bushing *E* in that circle and in the hole just drilled, automatically indexing the work for the next hole. This procedure is followed until all the holes in the circle have been drilled.

It will be noted that the two inner circles in the bushing plate have each three bushings instead of two, as in the outer circle. The reason for this is to protect the operator's hands when indexing. He has to be careful only when drilling the second hole because for the remaining holes the pin is inserted in the hole that is farthest from the drill.

The downward pressure in drilling is taken care of by a lug that is an integral part of the base. A slip bushing is used in drilling the center hole and is removed for tapping. The circle of holes to be tapped for ⅜-in. pipe is drilled through the bushing *K*, using the middle circle of large holes for indexing, as it is farther from the drill. By the use of an additional bushing plate and by drilling other clearance holes in the work holder, the jig was adapted for drilling smaller tube sheets.

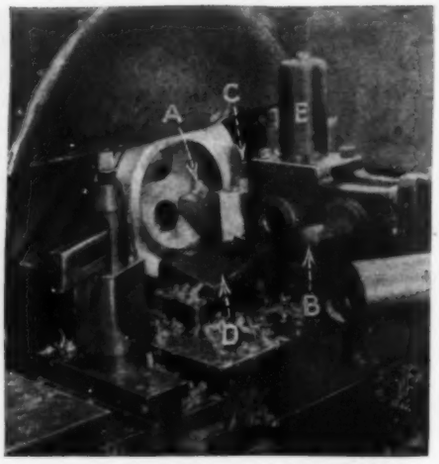
Forming and Undercutting a Domed Head

FRANK C. HUDSON

In these days of higher compression in internal-combustion engines, the machining of the surfaces that form the compression chamber is increasingly important. Instead of using a formed tool to secure the shape of domed head desired, as is quite common, the Kinner Engine Company, Glendale, Calif., has devised an interesting method that uses a radius toolholder and a wedge or flat cam, to move the tool along the desired radius. The device is shown herewith.

The tool point *A* is held in a heavy shank or holder that is pivoted at *B* which gives the proper radius for the domed head. This tool shank can be removed and replaced by a shorter one by using the pivot hole nearer the tool point, so that this tool serves two sizes of heads. The screw *C* projects through the tool shank and bears on the wedge *D* that is fastened to the cross slide. The slide is set in the right position, against a stop, at the start of the radius turning operation. With the radius tool against the center of the domed head, which has been spotted by a drill point in the first tool posi-

tion of the turret, moving the cross slide forward forces the tool point up and turns the head radius. A spring in the case *E* holds the tool in contact with the wedge. Tools in other turret positions bore the head to the proper diameter and a specially shaped tool forms the undercut between the bore and the dome. This undercut is made by forcing the tool up with the wedge used in the radius boring operation. The head is faced by the tools in the cross slide.



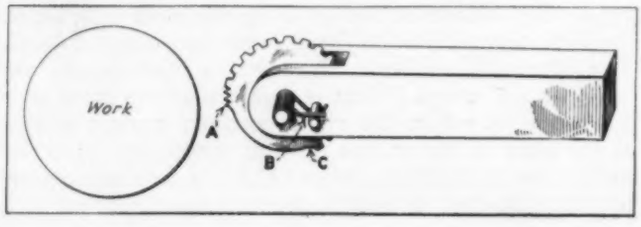
A Rotary Stamp for the Screw Machine

HERMAN A. MYERS

We use rotary stamps for marking work being made in turret lathes and automatic screw machines. The stamps in former use were cut on blanks of the same circumference as that of the work, so that in theory the characters would register revolution after revolution. These stamps gave us considerable trouble because the center distance of the stamps and the work changed a few thousandths as the characters were imbedded in the work, causing them to creep and blur during successive revolutions.

I altered one of the stamps so that it would make just enough of a revolution to stamp the characters on the work and then stop. This was done, as shown in the sketch, by grinding the blank part of the stamp to a smaller diameter and cutting three sharp teeth at increasing diameters at *A*. The center pin was made tight in the stamp and the short pin *B* was driven into it at a right angle. A coil spring was placed on the center pin, the ends being attached to the pin *B* and to a stop pin in the holder. When the short pin is in contact with the stop pin, the stamp is in the starting position.

In operation, the stamp is fed in until the teeth bite into the work just enough to make it rotate with the work. Rotation continues until the stamp comes to the clearance at *C*; when it stops for want of contact. When the stamp is withdrawn from the work, the spring rotates it backward until the pin *B* contacts with the stop pin in the holder, bringing it to the starting position. This stamp can be used on work of any size large enough to receive all the characters, thus saving a large investment in stamps. Formerly one stamp was required for each diameter of work.

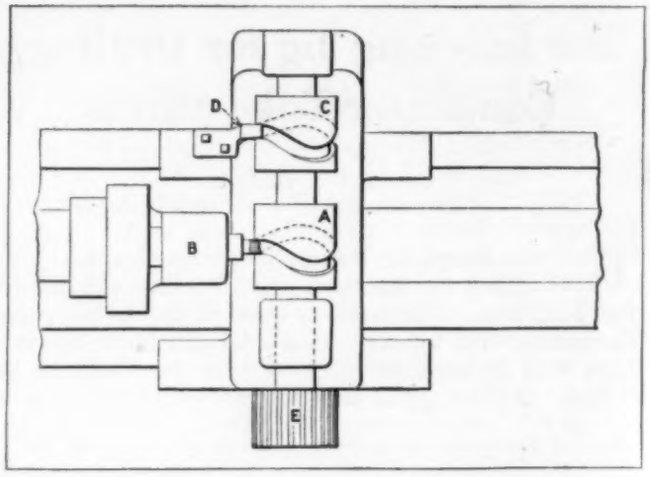


An Improvised Cam Cutting Machine

HENRY C. FRANCIS

A small shop in a southern city makes textile machines, which require a few barrel cams, but not enough to warrant a cam cutting machine. They are not near enough to a shop with a cam cutter to send them out. So the foreman took a small lathe that was not needed in the regular work since the introduction of a turret lathe and made a simple attachment that bolted on the lathe carriage, as shown.

The attachment consists of a base plate with uprights at each end to carry the bearings for the work spindle.



The cam to be cut is fastened on the mandrel as at *A* and the carriage moved up to the lathe head until the end mill in the spindle at *B* enters to the proper depth. The master cam *C* and the guide pin *D* control the end movement of the cam being cut as it turns. The guide *D* is fastened to the carriage and the attachment moves freely in place of the tool slide guided by the master cam and guide pin. A wide-faced gear *E* on the end of the cross spindle is driven from the cross-feed gear in the lathe carriage.

In view of the few cams to be cut, this seemed to be a good use to make of a lathe that was no longer needed in its regular field.

Saving Time in Planer Work

D. Q. DUNSTONE
Hetton-le-Hole, England

The planer is one of few machines that offers little opportunity for subsequent work to be set up while the work in hand is being machined. A considerable proportion of planer work is of such a character that the machine needs no attention from the operator for quite long periods. However, due to the variety of work met with, it is often essential that one operator be allotted to each machine. The resulting time wasted may be considerably reduced by the introduction of an additional table.

A suitable number of pedestals equipped with rollers should be erected at each end of the machine, so that while one table is carrying work being machined, the second table is resting on rollers at one end of the machine. A buffer is cast on the end of each table and a

coupling is provided, so that the table carrying finished work may be used to draw the table carrying new work on the machine, which finally pushes the finished job on the rollers provided at the end of the machine. The tables are then uncoupled and the new work is machined, while the finished work is replaced by the next job on the idle table.

Care must be taken to have the distance between the coupled tables such that the rack on the table being drawn onto the machine will mesh properly with the bull wheel.

This arrangement will effect a considerable saving in time, since new work can be set up on the idle table while the work in hand is being machined.

Making and Checking a Flat Square
Discussion

R. H. KASPER
Master Mechanic,
Steel Heddle Manufacturing Company

The recent discussions of John J. McHenry's article under the title given above (*AM*—Vol. 74, page 765) prompt further discussion.

The simplest method of checking squares, with which I am familiar, requires the use of a flat plate and four straight bars somewhat longer than the blade of the square to be checked. The first bar is clamped on the plate in any position. The head of the square is then placed against this bar, and the second bar is brought into contact with the blade of the square and carefully clamped. The third bar is located against the blade of the square while the head is held in contact with the second bar. The third bar is then clamped to the plate. The fourth bar is similarly clamped while the head of the square is held in contact with the third bar.

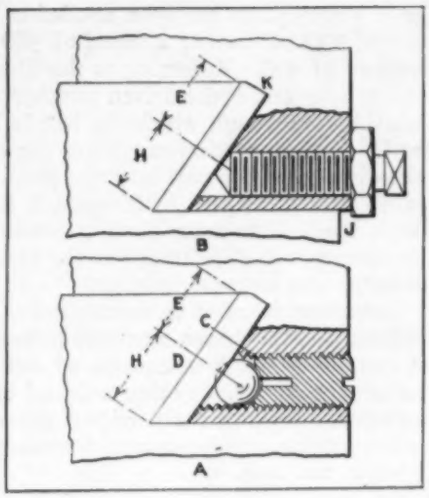
In this manner, a rectangular or nearly rectangular figure is produced, the first three sides of which have been positioned by the square, and are therefore subject to the same degree of error. If now the head of the square is held in contact with the fourth bar and the blade against the first bar, the cumulative error will be shown. This method consumes little time and does not depend upon the accuracy of any other tool.

Improvement in Gibs for Slides

FRANCIS W. SHAW
Tool and Gear Consultant
Heywood, Lancashire, England

While every endeavor should be made to avoid the use of flat gibs of the type illustrated, there is no good reason why, if used, they should be as inconvenient as is possible to make them, as they so frequently turn out to be.

Richard H. Kiddle (*AM*—Vol. 75, page 791) describes how he overcame the trouble caused by the adjusting screws working loose, by splitting the screws so that they would open out at their inner ends when screwed against a ball, as at *A*. But he shows the ball so positioned that it bears upon the gib at some line *C*. If it bore upon the line *D*, making the distances *E* and *H* equal, the tendency of the sliding surfaces would be to wear evenly.



The arrangement at *B* illustrates the present writer's practice. The adjusting screws have conical ends, the cones of which bear upon the gib so as to give the desired centralized pressure. Attention is drawn to the point that the upper slide at *J* overlaps the lower slide, enabling the screws when fitted with locknuts to be located lower down, so as to make the distances *E* and *H* as nearly equal as is possible.

The overlap has another purpose; that of safeguarding the slides against the admission of dust and cuttings. Too frequently, to avoid matching, the lower slide is permitted to project and form a ledge upon which cuttings can lodge and creep between the surfaces.

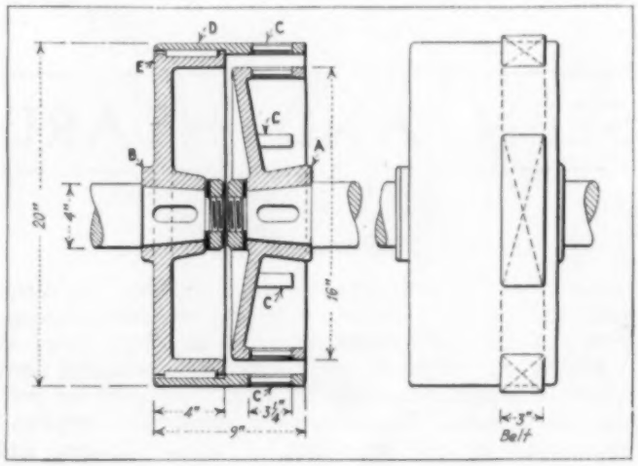
While it is, perhaps, rather more convenient to machine sharp internal corners at *K*, the upper member can either be strengthened by leaving in the metal, as shown, or alternatively, the slide can be narrowed.

A Flexible Coupling Permitting Free Endwise Flotation

J. T. TOWLSON
London, England

There is an almost universal familiarity with that type of coupling in which the flexible member consists of a leather or a Balata belt laced in and out of slots provided in the circumferences of both the driving and the driven members. The writer has had particularly close experience with this type of coupling on both large and small units. While such devices are extremely useful, they make no provision for endwise flotation of the shafts, and the lack of such provision gives rise to a tendency for the flexible member to tear at the edges.

The coupling illustrated has ample provision for end-



wise flotation. It has been applied to a motor-generator set of 100 hp. having a speed of 480 r.p.m. and an a.c. voltage of 400. Referring to the illustration, *A* may be the driving and *B* the driven member, or vice versa. The usual slots through which the belt is laced are indicated at *C*. The innovation providing for endwise flotation is the division of one part into two parts and consists of the shell *D* and the part *E*, the part *E* having four feather keys fitted in its outer surface, while the shell has four featherways to slide freely on the feather keys, thus permitting free endwise flotation.

Attention is called to the method of attaching both the driving and the driven members to their respective shafts, a method which it is considered could be adapted with advantage to various other units of the same class. The advantage is particularly evident when disassembling and reassembling are necessary, because the members will always run true.

Real Appreciation

I would like to express my appreciation of the articles that are published in the *American Machinist* under the heading, "Ideas from Practical Men."

In my department we have a few ideas in use that we have made from sketches and drawings published on this page, but the one that is appreciated the most is a device for lifting the dividing head on and off a milling machine. It is a simple gadget made out of steam piping. By the aid of a small screw which fits a tapped hole purposely made in the dividing head, the operator is able to swing the head out of his way when not in use.

In a shop like ours, a maintenance department where jobs are constantly changing, a day seldom passes without this device coming into play. I pay a tribute to the man who designed it. —G. T. HEATON,
Charles Baynes, Ltd., Blackburn, England.

I frequently notice some new or different design in dies that appears from time to time in *American Machinist*. Most always these appear under the head, "Ideas from Practical Men."

In Vol. 76, page 375, is a good one by Charles F. Kraut, "Die Fitted With a Stock Equalizer." It is clever and practical. We have been looking for something like this for a long time, and for what it does, it is simple and inexpensive to make. —C. W. HINMAN,
Chief Tool Designer, Kobzy Tool Company.

SEEN AND HEARD

JOHN R. GODFREY

Machining Illium

Attention to corrosion-resistant properties in metal parts has brought new machining problems into the shop. Some of the more recent non-ferrous alloys range in hardness and toughness above ordinary steels, and need methods in machining differing from those used for even the hard bronzes. Illium, which has lately been employed extensively for cast pump parts, chemical processing and mining machinery parts, has a fairly high percentage of chromium and nickel together with tungsten and molybdenum. It can be turned readily at speeds to 30 surface feet per minute with a 0.032-in. feed if super high-speed tools are used. The tool for turning is ground with a flat lip, 6- to 8-deg. positive rake, and about 5-deg. nose clearance.

Where Experience Doesn't Count

Experience has often been said to be a dear teacher but here is a case where it bars a man from a job. Welding is one of the jobs where individual skill still counts for much, except perhaps where it is done by automatic machinery. But on such work as welding airplane structures the man is the most important factor, and that is why one well-known concern will not hire a welder who has ever worked at welding in any other plant. They insist on training every welder in their own shop by their own method, and they take two years to do it. They begin on simple work, test welds, and teach all that they have learned in years of building steel structures, but no welder touches the vital parts of the structure until he has had two years' training. Perhaps some standardization as to methods and the use of X-ray or similar apparatus may change this somewhat. For there are men who can change their methods when they know why certain cases require special treatment.

A little less drastic is the firm which will not hire a heat-treater who has been out of this work for more than two years. This is on the ground that changes are coming so rapidly in this field that the older methods are unsafe in many cases.

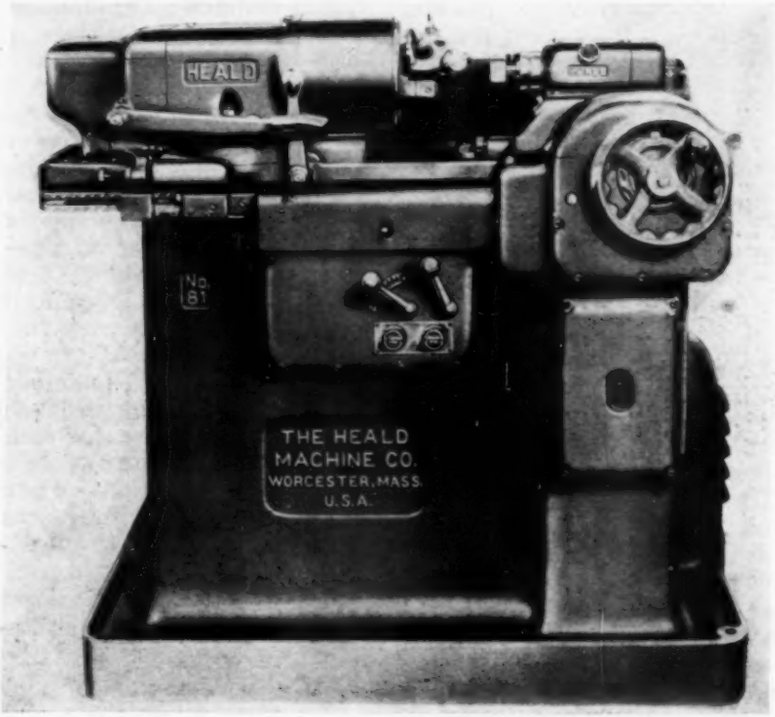
Lathe Apron Bearings

A maker of replacement parts for motor vehicles is evidently using his machine equipment about to the limit. He is even wearing out the gear shaft bearings in the aprons of his lathes and wants these bearings bushed for easy replacement. He is getting out more product with fewer machines by using more power per machine and keeping the machines in first class condition. Careful attention to wheel selection, plus a large motor, has greatly increased the output of his grinding machines. "Fewer and better machines" seem, to be his motto.

Ice Box Annealing

There seems to be a little misunderstanding in some quarters regarding the annealing of duralumin or similar rivets by putting them in an ice box. The practice of one large company is to anneal them in the furnace in the regular way, quench them in water, and then keep them soft in a box cooled with dry ice. For best results, it is necessary to get the rivets into the ice box as soon as possible after quenching. One difficulty however is that they freeze into a solid mass unless all the water is removed after quenching. So this concern drops them into a whirler, or centrifugal separator, as soon as they come out of the quenching bath. This dries them in a few seconds, and they go into the ice box with the least delay possible. When kept cool in this way they remain soft for a week instead of having to be re-annealed every hour as formerly.

SHOP EQUIPMENT NEWS



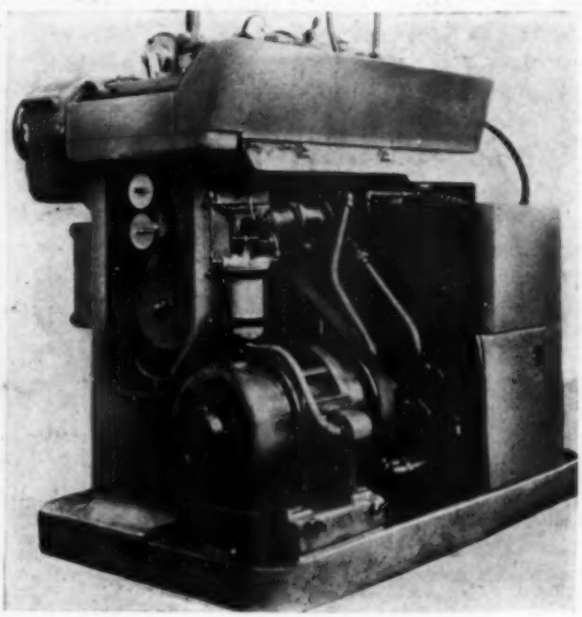
Heald No. 81 Internal Grinding Machine

AN INTERNAL grinding machine for handling small work is now being manufactured by Heald Machine Co., Worcester, Mass. The machine is fully automatic with the exception of starting, loading and unloading. It can be arranged to size work 'size-matically" or "gage-matically" similar to the company's No. 72 Size-Matic or Gage-Matic machines, or can be arranged, if desired, to simulate a combination of the two. All machines can be operated as plain units. While general functions of the No. 81 are similar to those of the No. 72 Heald internals, there is one distinct difference in that the workhead and work reciprocate with the main table instead of the wheelhead and wheel doing so. This arrangement permits the machine to be more simple and compact and also permits the entire unit to be driven by one standard single end motor. It permits more rigid support of the wheelhead and higher operating speeds as well as putting the cross-slide and control box in fixed relationship to one another, thus allowing all mechanical controls for sizing.

Particular attention has been given to guarding and inclosing units, mechanisms and belts. Guards that must be removed for minor adjustments or service are held with springs and can be removed without tools. The work is guarded against splash and leakage of coolant, the table dogs are covered, and the cross-slide feeding mechanism is inclosed and runs in oil. This mechanism has a built-in motor with built-in electrical controls, also a self-contained water tank located within the size limits of the base. The table has an automatic drive with all controls and adjustments for setting up centralized in front of the machine. Anti-friction bearings are provided for all revolving members. Wear on the wheel is taken care of by compensation on the cross-slide.

The base of the machine is a heavy one-piece box-type casting weighing about 1,450 lb. and resting on a three-point bearing. One V and one flat way with a center distance of 7 in. support the sliding table. Both ways are scraped to master plates. An oil reservoir is inclosed in the base and the lower portion of the base is extended to add to the rigidity of the machine. The main table travels on a flat and a V-way, lubricated by gravity feed from a reservoir in the right rear corner of the water pan. This oil passes through a cleanable disk-type filter. The reverse valve and cylinder which drive the table are one unit, simplifying piping. The workhead travels with and is mounted on a swivel circle on the table. All auxiliary units, such as the plug sizing device on the gage-matic and fixture operating mechanism, are inclosed by removable covers.

An in-and-out diamond adjustment is provided just in front of the operating chuck and may be seen in the front view of the machine. The fixture-operating lever extends to the right and is grouped with the workhead stop and start lever. On the gear box just below are the table run-out latch, the table-speed throttle lever and the table-reverse lever and



SPECIFICATIONS

Length and width of base on floor	30½ in. x 51 in.
Floor space (total)	42 in. x 55 in.
Swing over table	13½ in.
Swing inside of standard water guard	7½ in.
Maximum length of hole that can be ground	2 in.
Maximum diameter of hole that can be ground	1 in. recommended, actually limited by capacity of fixture
Maximum included angle of taper (standard Size-Matic only)	30 deg.
Center of chuck spindle from floor	44⅜ in.
Diameter of workhead spindle flange	6 in.
Hole through workhead spindle	1¼ in. dia.
Workhead speeds (standard machine)	900-1650 R.P.M.
Table speeds unlimited between	0-40 ft. per min.
Table travel	11 in.
One graduation on hand wheel	.001 in. on dia.
Power cross feed, minimum — Standard feed gears	.00017 in. on dia.
Power cross feed, minimum — Fine feed gears	.00007 in. on dia.
Power cross feed, maximum — Standard feed gears	.00102 in. on dia.
Power cross feed, maximum — Fine feed gears	.00042 in. on dia.
Motor (hp.)	5 or 7½
Motor (speed)	1800
Capacity of oil tank	9 gals.
Capacity of water tank	11 gals.
Weight of machine, net	3200 lbs.

below them the truing-speed and finishing-speed button controls. The cross-feed handwheel is at the right, with the motor switch below it. In the rear view may be seen the wheelhead idler and coarse weave belt, oil filter, the 5-hp. driving motor, the gear-driven oil pump for the hydraulic system with the water tank above it, and the simple piping. The water pump is directly connected to the motor by a flexible coupling on the far side of the oil pump.

Wheelheads used on the machine are built especially for high speed, the smallest size spindle running at 42,000 r.p.m. The head is adjustable so that a single length of wheelhead belt is suitable for practically all sizes of pulleys. The wheel truing device drops hydraulically and is raised by a cam on the cross-slide. It works automatically under ordinary production conditions but by hand when truing a new wheel. General specifications are given in the table.

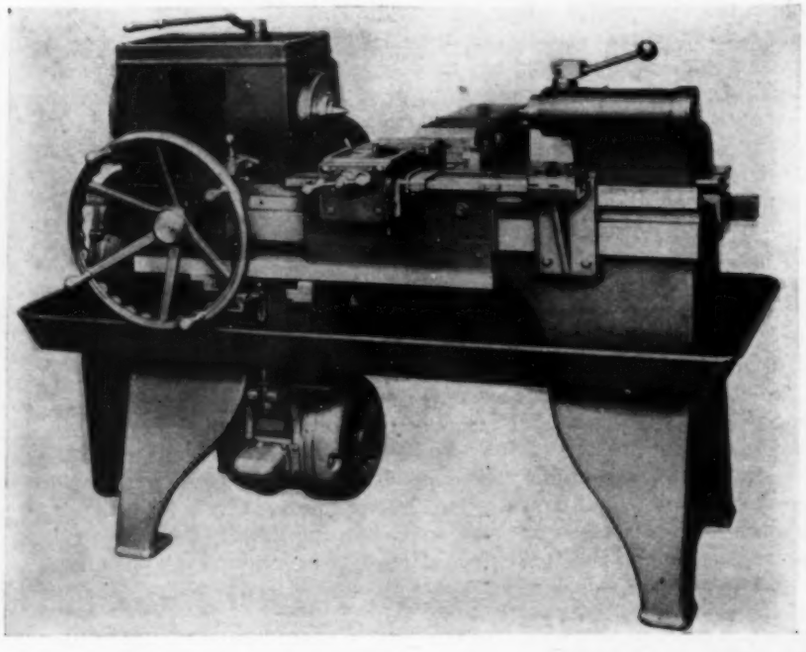
Sundstrand Junior Stub Lathe

A SMALLER lathe designated the "Junior" Stub Lathe and designed to meet present-day requirements for processing work rapidly is announced by Sundstrand Machine Tool Co., Rockford, Ill. It is claimed to have the strength, weight and rigidity to apply effectively 2½ to 3 times the power usually found in a lathe of this type, and has a speed range and feeds suitable for efficient operation of all cutting tools including the cemented carbides and diamond tools.

There are various features that provide for strength and operating convenience. Headstock and bed are a single casting. The cover plate on the headstock is recessed to form a tool tray, which may be removed easily in order to apply a third slide.

The master control lever above the headstock operates the spindle, feed clutches and brake. The spindle itself has an exceptionally large hole through it to permit the insertion of draw rods, and provision is also made for mounting non-rotating air cylinders or other chucking equipment on the rear end of the spindle. The spindle is made extra heavy to withstand the high stresses encountered, is machined inside and out for balance and mounted in anti-friction bearings. The tailstock also carries anti-friction bearings. The tailstock quill is traversed and clamped by a single lever. A large quill has been provided to permit ready adaptability to power operation. At the left of the rear view may be seen one of the two clamp screws which locks the tailstock adjustment.

Both front and rear carriages are unusually heavy with ample bearings to support the tools. A cam bar attachment may be mounted on the front of the apron, with the bracket adjustable on the bed to permit the use of a short bar and to facilitate setting. The attachment is used for automatic rapid approach of the front tools to the work and in form or taper turning. A trip dog bar is attached to the bottom of the apron and actuates the automatic control of spindle and feeds. An adjustable dog at the center of the trip dog bar automatically disconnects the drive to the feeds and the spindle, and applies the spindle-brake. The feed rack is provided with helical teeth. Just above the feed rack may be seen the automatic tool relief attachment. At the front of the headstock behind the handwheel is a lever for manual feed disengagement.

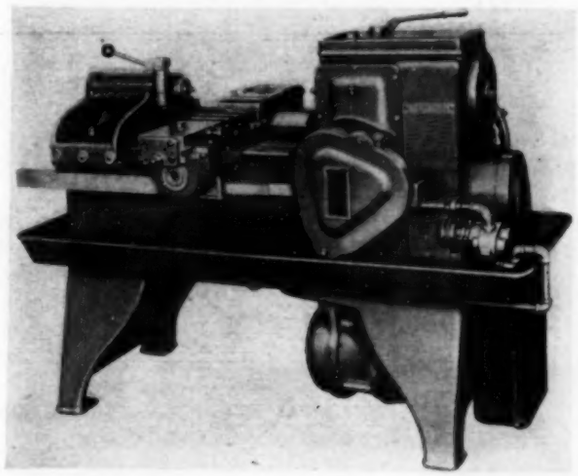


SPECIFICATIONS

Capacity between centers	18"
Swing over bed ways	12" dia.
Swing over front tool slide	8" dia.
Swing over rear tool slide	8" dia.
Spindle diameter	2¾"
Spindle nose diameter	5½"
Hole through spindle	1 13/16"
Taper hole in spindle nose	No. 5 Morse
Floor to center-line of spindle	41"
Spindle rotates	Counter-clockwise
Front Carriage — length on bed ways	17"
Front Carriage — extreme travel	23"
Front Carriage — movement to one revolution of handwheel	4¾"
Front Tool Slide width	6"
Front Carriage feeds (Standard)	.0015" to .042"
Front Carriage feeds (Special)	.003" to .084"
Tailstock	Anti-friction
Quill diameter	3"
Quill adjustment	4"
Taper hole for tailcenter	No. 2 Morse
Coolant tank capacity	10 gal.
Floor Space	78" long x 46" wide x 52" high
Net weight 2,050 lb. — with rear slide and motor	2,540 lb.
Shipping weight with rear slide and motor	2,750 lb.

EXTRA EQUIPMENT

Motor Drives — Optional as follows:	
5 hp. — 1,200 r.p.m.	Spindle speeds 128 to 1,346 r.p.m.
5 hp. or 7½ hp. — 1,800 r.p.m.	Spindle speeds 195 to 2,050 r.p.m.
7½ hp. — 3,600 r.p.m.	3,600 r.p.m. constant
Rear Carriage — Length on bed ways	8¾"
Extreme travel of rear tool slide	3"
Rear tool slide width	6"
Rear tool slide feeds (Standard)	.0006" to .017"
Rear tool slide feeds (Special)	.0012" to .034"
Coolant pump, V belt drive. Delivers	5 gal. per min.
Cam Bar Attachment	Tool Relief Attachment



The rear carriage is longitudinally adjustable and carries a slide actuated by a drum cam to provide desired feed movement, including dwell. Just below the tailstock clamp screw is the cover for the rear slide actuating rack which is shown uncovered at the right of the rear tool slide.

A large handwheel facilitates rapid movement of the front carriage and the rear slide.

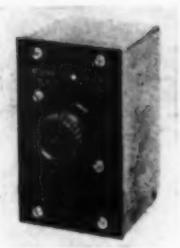
At the right-hand end of the rear slide actuating rack is shown the triangular case for the pick-off gears for both front and rear tool feeds. Independent pick-off gears are provided for each. The pick-off gears for spindle speeds are mounted below the spindle and have releasing taper seats to permit more secure mounting and smooth, steady operation.

A reinforced steel chip and coolant pan is provided. Large openings enable the removal of chips at front and rear. The rear view of the machine shows the coolant tank cast in the left leg. Coolant from this tank passes to the right of the machine to the coolant pump.

Below the bed can be seen the leaf upon which the motor is mounted. This leaf is arranged to permit adjustment of the multiple V-belt drive and also permits maximum accessibility and ventilation without limiting motor size.

Lincoln Type A-31 Improved Pushbutton

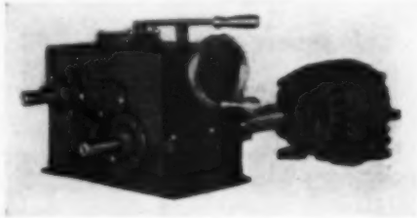
A number of improvements have been made in the safety push-button introduced early last year by Lincoln Electric Co., Coit Rd. & Kirby Ave., Cleveland, Ohio. A feature of the switch is that the start button is inside the stop button, as shown. Thus the stop button can be operated from any angle merely by striking the front of the control box with the flat of the hand, but the start button must be operated with the finger. With the new pushbutton, the stop button can be locked in the "off" position by pushing it in and twisting it to the right. Heavy springs prevent accidental operation of either button when not locked.

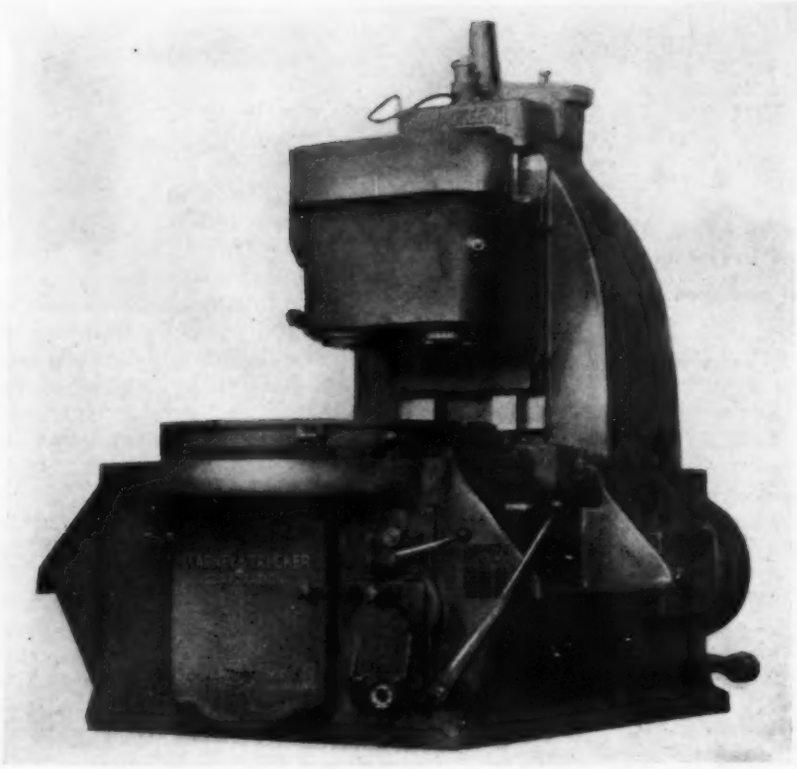


It is claimed the button will handle the heaviest control circuits up to 600 volts a.c. or d.c. because the contact opening is larger than usual. This is because the contacts are heavy double-break copper contacts with a positive wiping action. Contacts are inclosed in a dustproof, cold molded asbestos case. The button is self-contained and need not be taken apart or removed from the box cover for wiring. All terminals are marked clearly and brought out of the case to the back for accessibility. The new safety switch is to be known as Type A-31.

Lenney Variable-Speed Transmission and Reduction Unit

This variable-speed transmission and reduction unit combined has a speed range from 15 to 150 r.p.m., with motor turning over at a constant speed of 1,750 r.p.m. It has just been developed by Lenney Machine & Mfg. Co., Warren, Ohio. Forward, neutral and reverse can be accomplished instantly by a shift lever while the motor is in motion. Speed is controlled by a handwheel located conveniently on the box, and speed may be changed while the unit is in motion. No gears, screws, worms or belts are used in the unit, the motor being coupled direct. The manufacturer claims more quietness as a result of the new design. Speed ratios other than those mentioned can be furnished on order.

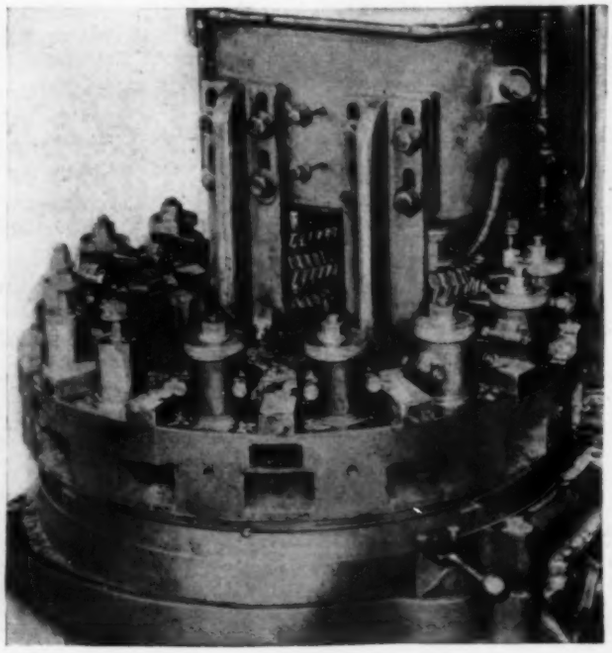




Milwaukee-Mil Rotary-Type, 36-in. Vertical Milling Machine

A ROTARY-TYPE vertical milling machine, developed for high-production manufacturing purposes, has been introduced by Kearney & Trecker Corp., Milwaukee, Wis. The machine embodies strength and rigidity, together with the high speeds and fast feeds necessary for application of tungsten- and tantalum-carbide cutters. Such operations as face, side and straddle milling, slotting, form cutting and the finishing of radial faces are among the classes of milling that can be handled in the machine. The table, 36 in. in diameter, is driven by a large, heavy worm-wheel, almost equal in size, mounted solidly on the bottom side. Table feed changes, of which there are 18, are by means of pick-off gears. Changes are made at the feed-change box located at the front of the machine next to the control levers. A table feed ratio of 40 to 1 is provided so that full benefits of the newer cutting materials may be gained even in cases where the cut is light or where the material being machined is soft, such as aluminum, where unusually fast feeds are desired.

The table has two feed rates, one the normal feed and the other power rapid traverse. In operation, the table can be fed at the selected feed rate through the cut, then it can be engaged in rapid traverse at the rate of 240 in. per min. to the next station, after which the normal feed is again engaged. Table control is by means of two levers—one at the right adjacent to the table for directional control, and one at the front of the bed for selecting the table movement, either feed or power rapid traverse. A crank is furnished at the end of the bed for hand movement of the table in either direction as a convenience in setting up.



Either a single- or double-spindle head may be furnished as desired. The head illustrated has two spindles. One is mounted in a quill and with ample adjustment to compensate for cutter wear. Special heads with one or more spindles in any position or combination may also be obtained.

Speed changes for the head are by means of pick-off gears located in the box at the top of the upright. Spindle speeds are furnished in any one of four optional ranges of 15 to 150; 20 to 200; 30 to 300; or 50 to 500. There are 18 speed changes to each range. The spindle control lever is at the front of the machine, at the right side, thus grouping the three control levers for convenient operation at the normal loading position.

Capacity of the machine is: Vertical adjustment of spindle, 10 in.; maximum distance face of spindle to top of table, 14 in.; minimum distance face of spindle to top of table, 4 in.; cross adjustment of head, 8½ in.; maximum distance center line of table to center line of spindle, 16½ in.; minimum distance center line of table to center line of spindle, 8 in.

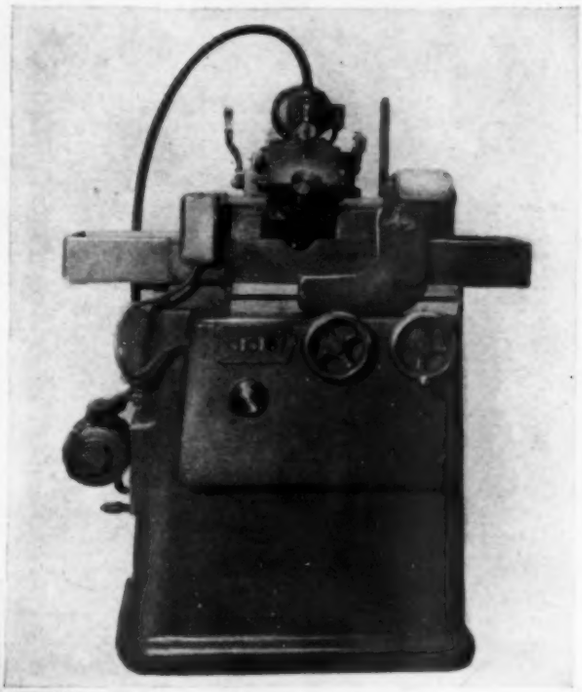
The machine bed has two large reservoirs, one for cutter coolant supply and one for oil lubrication. The machine is automatically lubricated.

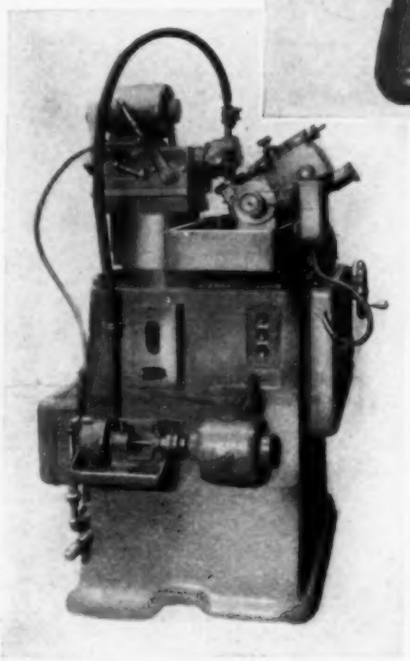
An application of the machine is illustrated in this photograph, which shows milling of forged steel spring seats. The cut constitutes straddle milling of two bosses. Cutters mounted on the spindle at the right rough these faces, and the others finish them.

The fixture, holding 14 pieces, is mounted on the rotary table. The operator loads and unloads at the front of the fixture while pieces at rear are being milled. Production averages 65 pieces per hr. For this set-up, outer supports for the arbors are mounted on the two-spindle head.

Fellows Automatic Helical Cutter Sharpening Machine

A FULLY automatic helical cutter sharpening machine adapted to sharpening of so-called "normal sharpened" helical gear shaper cutters is now being marketed by Fellows Gear Shaper Co., Springfield, Vt. This machine is provided with complete electrical control and is supplied with three motors, one reciprocating the table through a reduction gear and crank mechanism, another driving the pump for supplying coolant to wheel and work, and the third driving the grinding wheel through an endless canvas belt.





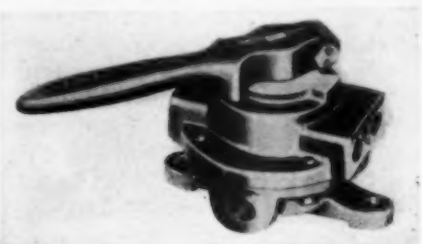
Right-hand end view of the machine showing motor-driven coolant pump, automatic tripping device, and other parts

The machine is of unusually rigid construction and provided with necessary adjustment for sharpening "normal sharpened" helical cutters either with a zero or a positive top rake. Cutters having helix angles up to and including 50 deg. can be sharpened. Indexing, as well as reciprocation of the cutter, is taken care of automatically, and an electrical control is arranged so that the machine stops automatically at the completion of each revolution of the cutter. As shown, three pushbuttons are provided at the front of the machine, one for starting reciprocation of the table, the second for "jogging" the table electrically, necessary when setting up, and the third for manually stopping the machine. A guard is provided for keeping the stop button depressed while the table is jogged.

With the machine as arranged, cutters up to 5 in. pitch diameter can be sharpened. All operating levers, push-buttons, etc., are centralized.

Hannifin Duplex Air Control Valve

Hannifin Manufacturing Co., 621 S. Kolmar Ave., Chicago, announces a duplex air control valve for use on machines that employ two air cylinders operating in progressive sequence. The valve has four independent outlet ports for control of two double-acting cylinders in either direction and in any sequence desired.

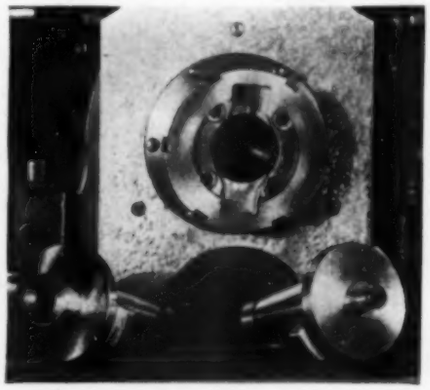


With the valve connected to two cylinders, a typical operating sequence would be as follows: Moving the lever 45 deg. from one extreme position causes the piston of cylinder No. 1 to move forward; moving the lever an additional 45 deg. causes the piston of cylinder No. 2 to move forward; moving the lever back 45 deg. reverses cylinder No. 2, and returning it to its original position reverses cylinder No. 1. Another arrangement is one in which both cylinders are reversed when the lever is in neutral position. Moving the lever 45 deg. to the left causes the piston of cylinder No. 1 to move forward, moving it 45 deg. right causes the piston of cylinder No. 2 to move forward. Moving the lever to neutral reverses either of the cylinders.

These duplex valves embody all the features of the standard Hannifin "Packless" control valves. They are furnished in two sizes: Model D-37 with $\frac{3}{8}$ in. I.P. connections, and Model D-75 with $\frac{3}{4}$ in. I.P. connections.

Cincinnati Quick-Change Collets and Shell End Mill Arbors

The Cincinnati Milling Machine Company, Cincinnati, Ohio, is announcing a new line of quick-change collets and quick-change shell end mill arbors to be used with the new quick-change adapter illustrated. The adapter is easily mounted on the nose



of any milling machine having a $5\frac{1}{16}$-in. diam. standard spindle nose with the national standard taper hole ($3\frac{1}{2}$-in. taper per ft.).

The collet (or arbor) is inserted in the adapter until its taper fits snugly

into the non-sticking taper hole of the milling machine spindle. One-fourth turn of the ring nut in a clockwise direction locks the collet securely. The time required to remove a quick-change collet and replace with another collet is claimed to be but one-third minute. Accurate alignment is maintained because the collet is seated in the spindle taper hole by end pressure produced by the nut.

This new arrangement is valuable in reducing idle time and makes it possible to perform a variety of operations—drilling, boring, end milling, face milling or shell end milling on a piece of work with but one setting. Collets or arbors are selected for the various cutting tools and arranged in a convenient manner on the operator's workbench, in the same sequence as the operations to be performed.

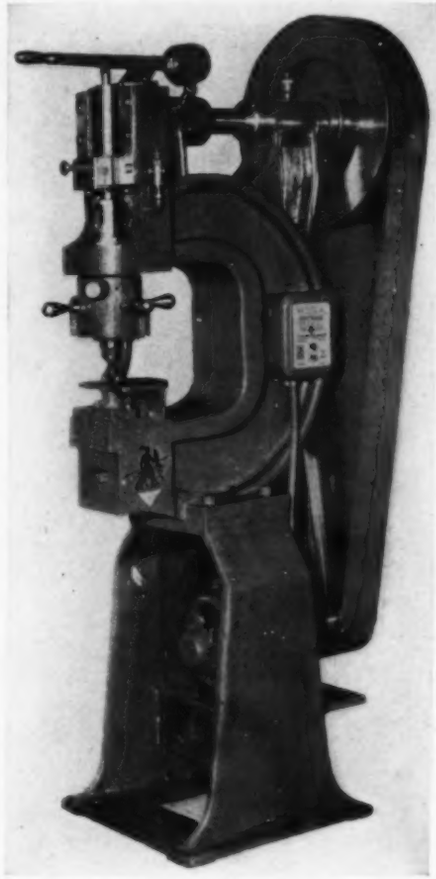
Quick-change shell end mill arbors are available for shell end mills having national standard diameters of: 1¼, 1½, 1¾, 2, 2¼, 2½, 2¾, 3, 3½, 4, 4½, 5, 5½, and 6 in. The collets are offered with No. 7, 9, 10 and 11 B & S, No. 2, 3, and 4 Morse tapers, either plain or tang drive. A draw-in bolt is supplied for use with collets having plain drive.

Savage No. 312 Improved Nibbling Machine

Increased capacity features the improved design of the No. 312 nibbler-type machine manufacured by W. J. Savage Co., Inc., Knoxville, Tenn. Rated capacity of the machine is now ½ in. and is made possible by a new type of construction. The revolving head, an original element of the Savage nibbling machine, has been redesigned, and the construction has been changed to add strength to the cutting members.

The stripper has been redesigned, the bearing surface increased and quick-acting adjustments provided to facilitate handling of heavier plate. Appearance, safety and convenience to operator have been considered in recessing the chip box. Heavier construction has been used throughout to avoid vibration encountered by increasing capacity. Multiple V-belt drive lessens loss of time due to belt slippage, etc., and prevents transmission of shocks from machine to motor. Full safety devices are applied. Adjustable motor bases permit necessary take-up.

Improved cutting tools and toolholder are provided and full provision is made for cutting, either to the line or by a templet. Cutting tools of proper design are furnished for each operation. For positive control, a hardened gag is provided which enables the operator to engage or disengage the cutting assembly instantly. This action raises the entire ram when disengaged, lifting the cutting tool clear of the cut to give the operator an unrestricted view. Also, sheets may be placed in position for cutting without adjusting the tool for clearance. Simply pulling down the gag lever at the top of the machine engages the mechanism.

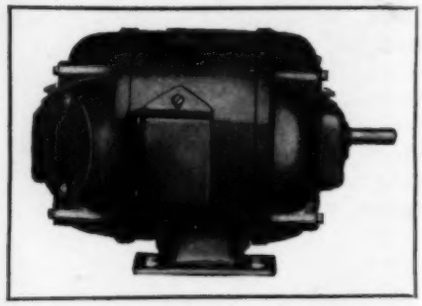


A heavy eccentric in the crosshead absorbs the thrust on each stroke. Laminated shims on the crosshead enable the operator to compensate for natural wear. The front bearing on the drive shaft is heavily bushed. Raising or lowering the ram, as the occasion may require, is done by adjusting a ram locknut and a bushing adjusting nut enables the operator to compensate for wear in the ram bushing. The ram bushing itself is of the split tapered type fitted in the ram housing, which is machined from a solid steel block. The revolving head is a split assembly removable if necessary with adjusting nuts on each side.

Adjusting screws in the die block permit die adjustment. Locking screws are provided, one for the die and one for the adjusting screw. The steel stripper has a micrometer-type adjusting screw, and a quick-acting adjustment nut locks the stripper in position.

Century Electric Single-Phase Induction Motors

A new line of brush-riding, single-phase, repulsion-start induction motors has been developed by Century Electric Co., St. Louis, Mo. These

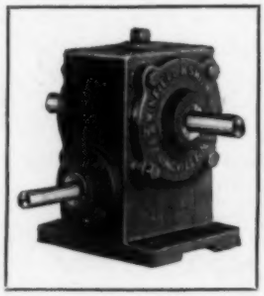


are intended primarily for those applications where very quiet operation or higher operating characteristics are not required. This line of motors is not intended to replace Century brush-lifting motors, which will continue to be made for long-hour-per-year applications.

Smith Worm Gear Speed Reducers

Two new series of worm gear speed reducers have been introduced by Winfield H. Smith, Inc., Springville, Erie County, N. Y., to round out the company's line and enable it to offer standard units for practically any requirement from 1/20- to 5-hp. output capacity.

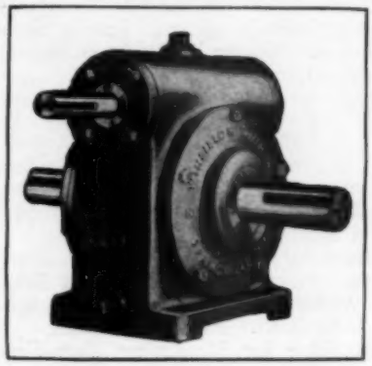
No. 3½ B, designed for transmitting loads up to ¼ hp., has a housing with solid top and large side cover plate. This construction permits keying the worm gear to the shaft, and complete assembly work on the worm gear shaft can be made before it is put in the housing. The worm gear is of phosphor bronze mounted on Timken



Ratio:	1–6	1–9	1–12	1–15¾	1–18	1–24	1–26	1–36	1–47	1–60
Hp. Output	1.5	0.75	1.0	0.5	0.5	0.63	0.63	0.33	0.25	0.25

roller bearings. The worm is of hardened steel cut integral with the worm shaft, mounted on Gurney radial thrust ball bearings. All shaft extensions are protected by special oil seals. Standard ratios are 58:1, 36:1, 18:1 and 9:1. A large number of special ratios is also available.

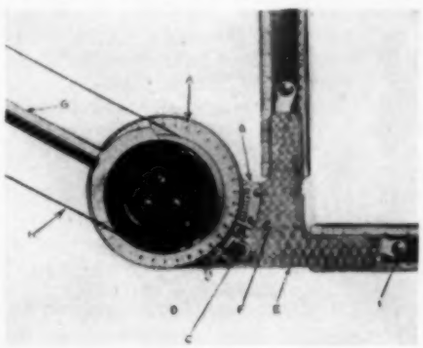
No. 4½ T is designed for medium-duty service and has the worm located above the gear. The worm is cut integral with the high-speed shaft, which is mounted on radial thrust ball bearings. Other parts are similar to those of No. 3½ B. Standard ratios and hp. capacities, based on 1,750 r.p.m. of the high-speed shaft, are included in an accompanying table.



Improved Bruning-Wallace Drafting Machine

An improved drafting machine is now being manufactured by Charles Bruning Co., Inc., 818 Santee St., Los Angeles, Calif. Its maker estimates a saving of 25 to 40 per cent of drafting time, coupled with greater accuracy than when using ordinary methods. The unit may be pushed out of the way to leave the top of the drafting table free. It is ball bearing equipped throughout. The double table clamp is of heat-treated aluminum alloy, while tubes and scale plate are of duralumin. All steel parts are of tool steel, chromium-plated. The 4½-in. diam. protractor is nickel silver, and can be turned in a full circle. It has accurate machine-cut graduations and a vernier reading to 5 min. Automatic stops at 0-30-45-60 and 90 deg. in all four quadrants are provided. The working radius of the standard-size unit is 44 in., or an 88-in. circle. Tube arms are 19¼ in. long. The clamp or anchor is designed to be used on any edge of the board.

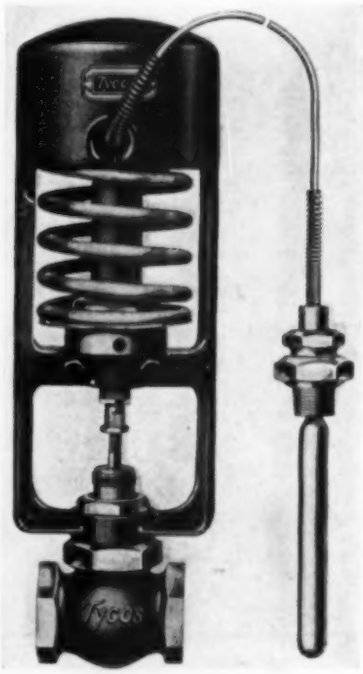
The small illustration shows a close-up of the protractor head. Two scales seen at right angles to each other revolve with the vernier around the protractor. These stops may be set or released simply by moving knob *F*. *A* is the protractor, *B* vernier, *C* thumb release operating the automatic stop, *D* protractor clamp, *E* scale plate, *F* automatic indexing stop lock, *G* tube with knurled hand grips to adjust protractor and tension of band, *H* pulley band, and *I* scale adjustment.



Other sizes of drafting machines and left-handed units are supplied on order.

Tycos Self-Acting Temperature Regulator

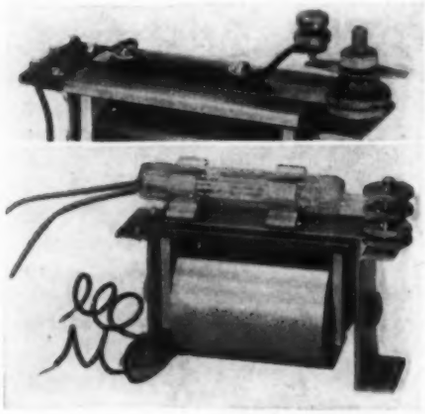
In the Tycos regulator announced by Taylor Instrument Companies, Rochester, N. Y., friction is claimed to be practically eliminated, resulting in immediate action of the valve stem corresponding to the temperature change. The tube system is also of new construction, being a double seamless bellows with heavy copper connection tubing and small rustless steel bulb with thin wall. The thin wall increases rapidity of response, and the set-up of the system permits minimum volume of actuating medium. The system is also so arranged that the bulb may be heated beyond the upper limit without injury.



Among applications for this type of regulator are plating tanks, pattern shop glue kettles, water or liquid storage tanks and drying rooms.

Aminco Supersensitive Relay

A supersensitive relay that will break 1,320 watts with 4 milliamperes, at six volts, that is impervious to dust and dirt, and is safe where an open spark would be hazardous, has been announced by American Instrument Co., 774 Girard St., N.W., Washington, D. C. It will be marketed under the trade name "Aminco" and is designed to control relatively heavy currents through the limited mechanical impulse of thermostat action or through variations in electrical resistance set up by varying the in-



tensity of light striking a photo-electric cell.

Relays are made in two styles, in both of which coils, armatures and frames are identical. The relay coil has a resistance of 1,300 ohms and operates on 4 m.amp. at six volts d.c. Relays can be provided for special purposes with coil resistances up to 50,000 ohms. The relay shown at the top, for example, with open platinum-iridium or silver contacts, will break 50 watts. The relay shown below, with a Burgess vacuum contact, will break a maximum of 1,320 watts. Contact is made and broken in an exhausted and sealed transparent glass tube.

No covers or special bases are required for either instrument. Descriptive leaflets are available.

• PATENTS •

APRIL 19, 1932

Metal-Working Machinery

Metallurgical Device (Heat-Treating Fixture). William J. Chapin, Chicago, Ill., assigned to Chicago Steel Foundry Co. Patent 1,854,179.

Means for Correctly Setting Relieved Taps in Thread-Finishing Machines. Ralph E. Flanders, Springfield, Vt., assigned to Jones & Lamson Machine Co. Patent 1,854,184.

Tension Device (Metal Rolling or Straightening). Lloyd Jones, Salem, Ohio, and Walter R. Clark, Bridgeport, Conn. Patent 1,854,198.

Combined Electrode and Cage Shaper. Earl W. Little, Indianapolis, Ind. Patent 1,854,206.

Machine for Measuring Taps. Harvey M. Allison and Ernest A. Walker, Worcester, Mass., assigned to John Bath. Patent 1,854,242.

Machine for Measuring Three-Fluted Taps. Harvey M. Allison and Ernest A. Walker, Worcester, Mass., assigned to John Bath. Patent 1,854,243.

Machine for Measuring Two-Fluted Taps. Harvey M. Allison and Ernest A. Walker, Worcester, Mass., assigned to John Bath. Patent 1,854,244.

Cutting Machine. (Broach-type Nibbler). Charles B. Gray, Millbourne, Pa. Patent 1,854,254.

Machine Tool. (Shaper with Rotary Cutter). Arthur J. Calpha, Brazil, Ind., assigned to Indiana Foundry, Machine & Supply Co. Patent 1,854,445.

Flash Removing Machine. Henry E. Morton, Muskegon Heights, Mich. Patent 1,854,522.

Metal Bending Press. Lee F. Sickler, Amesbury, and Peter J. Linstrom, Medford, Mass. Patent 1,854,630.

Measuring Device for Machine Tools. Fernand Turrettini, Geneva, Switzerland, assigned to Société Genevoise, d'Instruments de Physique, Geneva, Switzerland. Patent 1,854,634.

Babbitting Machine. Harry H. Rawson, Spokane, Wash., assigned to Washington Machinery & Supply Co. Patent 1,854,718.

Fluid Pressure Tool. Gustave M. Neill, Detroit, Mich., assigned to Chicago Pneumatic Tool Co. Patent 1,854,856.

Welding Roll. James V. Caputo, Girard, Ohio. Patent 1,854,924.

Welding Machine. Clement C. Richard, Detroit, Mich., assigned to Allied Products Corporation. Patent 1,854,957.

Apparatus for Treating Metal Sheets. Ernest Griffiths, Liverpool, England, and Evelyn Edwin Griffiths, Mumbles, Swansea, South Wales. Patent 1,855,107.

Tools and Attachments

Indexing Device. Carl W. Floss, Detroit, Mich. Patent 1,854,251.

Automatic Adjusting Device for Tapered Roller Bearings. John R. Shoffner, Timblin, Pa. Patent 1,854,276.

Collapsible Tap. William J. Hogg and Frederick Neumann, Cleveland, Ohio, assigned to The National Acme Co. Patent 1,854,309.

Portable Power-Driven Saw. Joseph F. Haas, Forest Park, Ill., assigned to De Walt Products Corporation. Patent 1,854,510.

Angle Bar Shearing and Punching Mechanism. Carl Kirchner, Carthage, Mo., assigned to The Leggett and Platt Spring Bed and Manufacturing Co. Patent 1,854,516.

Magnetic Arc Control. Joseph A. Wilson, Middletown, Ohio, assigned to The American Rolling Mill Co. Patent 1,854,536.

Work-Feeding Mechanism. Jacob De Koning, Grand Rapids, Mich., assigned to Gallmeyer and Livingston Co. Patent 1,854,610.

Cutting Tool. Lewis Skeel, Meadville, Pa. Patent 1,854,632.

Pneumatically Actuated Percussive Tool. Josef Kohlen, Herne in Westphalia, Germany. Patent 1,854,656.

Chip Control Device. Albert E. Robinson and Charles E. Black, Cincinnati, Ohio, assigned to The American Tool Works. Patent 1,854,672.

Lubricating Apparatus. Clyde G. Butler, Cincinnati, Ohio, assigned to The Cincinnati Ball Crank Co. Patent 1,854,688.

Tool Stand. James E. Bales, Aurora, Ill., assigned to Lyon Metal Products, Inc. Patent 1,854,777.

Power Hammer. Leo F. Kott, Detroit, Mich. Patent 1,855,025.

Processes

Method of Making Pistons. Gilbert Michel, Bagneux, France. Patent 1,854,271.

Method of Making Tubular Metal Blanks. John Wycliffe Leighton, Port Huron, Mich. Patent 1,854,411.

Method of Making Propeller Blanks of Tubes. John Kenneth Jamison, Monessen, Pa., assigned to Pittsburgh Steel Products Co. Patent 1,854,550.

Process and Means for Metal Depositing. James B. Grenagle, Baltimore, Md., assigned to William W. Varney and to Universal Alloys, Incorporated. Patent 1,854,790.

Method of Making A Collet. Edwin L. Connell, Cleveland Heights, Ohio, assigned to Van Dorn Electric Tool Co. Patent 1,854,825.

Method of Grinding Irregular Shafts. Karl L. Herrmann, South Bend, Ind., assigned to The Bantam Ball Bearing Co. Patent 1,854,934.

• TRADE PUBLICATIONS •

CEMENT AND ADHESIVES. Technical Products Co., Pittsburgh, (15) Pa., has issued "Insa-Lute Cement and Compounds Catalog No. 32" containing information on industrial assembling, insulating, acid-proofing, etc. The booklet includes information on surface coating, impregnating, liquid porcelainizing, anti-corrosion, oil-resisting, heat-treating, furnace sealing, fireproof painting, electric insulation, repairing, etc.

JOINTS IN WIDE PLATES. The Engineering Experiment Station, University of Illinois, Urbana, Ill., has issued Bulletin No. 239, on "Test of Joints in Wide Plates," listing results of a series of tests of both riveted and welded joints. It is available from the station for $0.40.

OIL SEALS. Aetna Ball Bearing Mfg. Co., 4600 Schubert Ave., Chicago, has

issued a 16-page booklet entitled "They Shall Not Pass," describing the company's new oil seals and including a diagram showing its application to eliminate oil, grease, water and other liquid leakage and to keep dirt, grit and water from bearings.

QUICK DIE PROCESS. Quality Hardware & Machine Corp., 5831 N. Ravenswood Ave., Chicago, has issued a brochure on its quick-process method of making metal stampings in small lots cheaply. The process is adaptable for blanking, forming, piercing, drawing or embossing without expensive dies. Examples of a variety of parts are shown.

SILENT CHAINS AND SPROCKETS. Whitney Mfg. Co., Hartford, Conn., has issued complete catalog V-100 on the company's silent chains and sprockets, also including engineering data.

V-BELT. Gates Rubber Co., Industrial Division, Denver, Colo., has issued Bulletin 38-50, superseding Bulletin V-50-100 and V-32-100, giving sizes, prices and weights of Vulco Rope drives and listing the interchangeable belt sizes.

WEAR & LUBRICANT TESTER. Timken Roller Bearing Co., Canton, Ohio, has issued a booklet "Announcing the Timken Wear and Lubricant Tester," describing this new unit developed by Timken for obtaining accurate information on load carrying capacity of lubricants, measurement of friction, and wear characteristics of materials.

WIRE ROPE. American Cable Co., Inc., 230 Park Ave., New York, N. Y., has issued a booklet entitled "The Cardinal Reasons Why You Save Money with Tru-Lay Preformed Wire Rope."

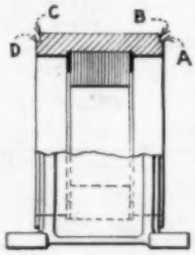
• EQUIPMENT ADAPTATIONS •

Recently Developed by the Makers

Gisholt Special Machine for Rabbet Fit Operation on Motor Frame

Since the rabbet fit on an electric motor frame locates the bearing brackets or end shields, which in turn align the rotor with the stator, machining of these surfaces must be accurate. Some manufacturers machine the fit during the boring operation on the motor frame and later bore the punchings in line by locating from the rabbet fit. Others prefer to bore the assembled frame and punching first and then machine the rabbet fit while locating the frame from the finished bore in the punchings.

Gisholt Machine Co., Madison, Wis., has recently designed a special machine for use in the latter procedure which will perform the rabbet fit operation on both ends of several sizes of motor frames in 3 to 4⅔ min. each floor-to-floor. The machine has a 44-in. swing and carries one adjustable fixed carriage and one traversing carriage on the flat ways. These carriages each carry three tool slides and contain the necessary cams and mechanisms for actuating the slides. An air-operated expanding mandrel attached to the spindle and supported in both carriages is provided to hold the frame, which is located longitudinally by a locater stop mounted on top of the fixed carriage. When the air is turned on, the piece is gripped in the bore of the punchings by three wide-faced jaw inserts. The traversing carriage is then moved up to the work by power, and a ball-bearing center support or pilot mounted in the housing enters the end of expanding mandrel to provide additional rigidity and accuracy. As soon as the work starts to rotate the front slides on the two housings start feeding in and rough out the surfaces *A*, *B*, *C* and *D* in the sketch. Reaching the end of their feeding stroke, the tools are held stationary for five revolutions of the work, then retracted ⅜ in. Finishing tools in the rear slides remain stationary during the first 17 revolutions of the work, then start feeding in and reach the work as the roughing tools retract. The two finishing slides also carry chamfering tools to clean up the burr on the pilot diameters *A* and *D*.

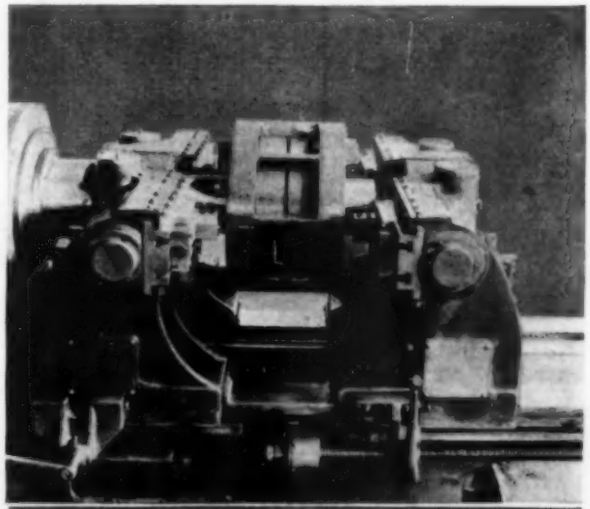


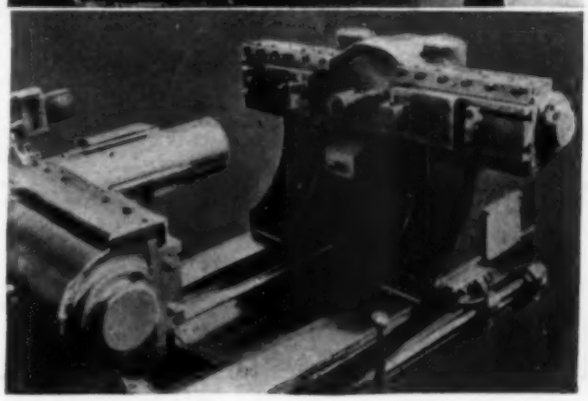
The sizing tools held in the slides underneath the work are timed to start cutting just when the finishing tools retract from their holdup. These tools remove very little metal, just cleaning the surfaces *A* and *D* within the 0.002-in. allowance. Just as these tools complete their holdup of three revolutions, the machine trips into traverse and the slides in both carriages return to their starting positions while the traversing carriage is returned to the end of the ways so that the piece just finished may be removed from the machine.

Cemented tungsten carbide tools are used at cutting speeds in accordance with motor manufacturer's established practice. On 18 different motor frames for which the machine is tooled, the rabbet fits are of three sizes for which times are:

Rabbet Fit Diameter	Machining Time	Floor-to-Floor Time
15 in.	1.8 min.	3 min.
17 in.	2.2 min.	3½ min.
19 in.	2.7 min.	4⅔ min.

Besides the 18 motor frames for which the machine is tooled, a similar series of frames with female rabbet fits may be handled in the machine with the addition of a few tool blocks and appropriate tools.





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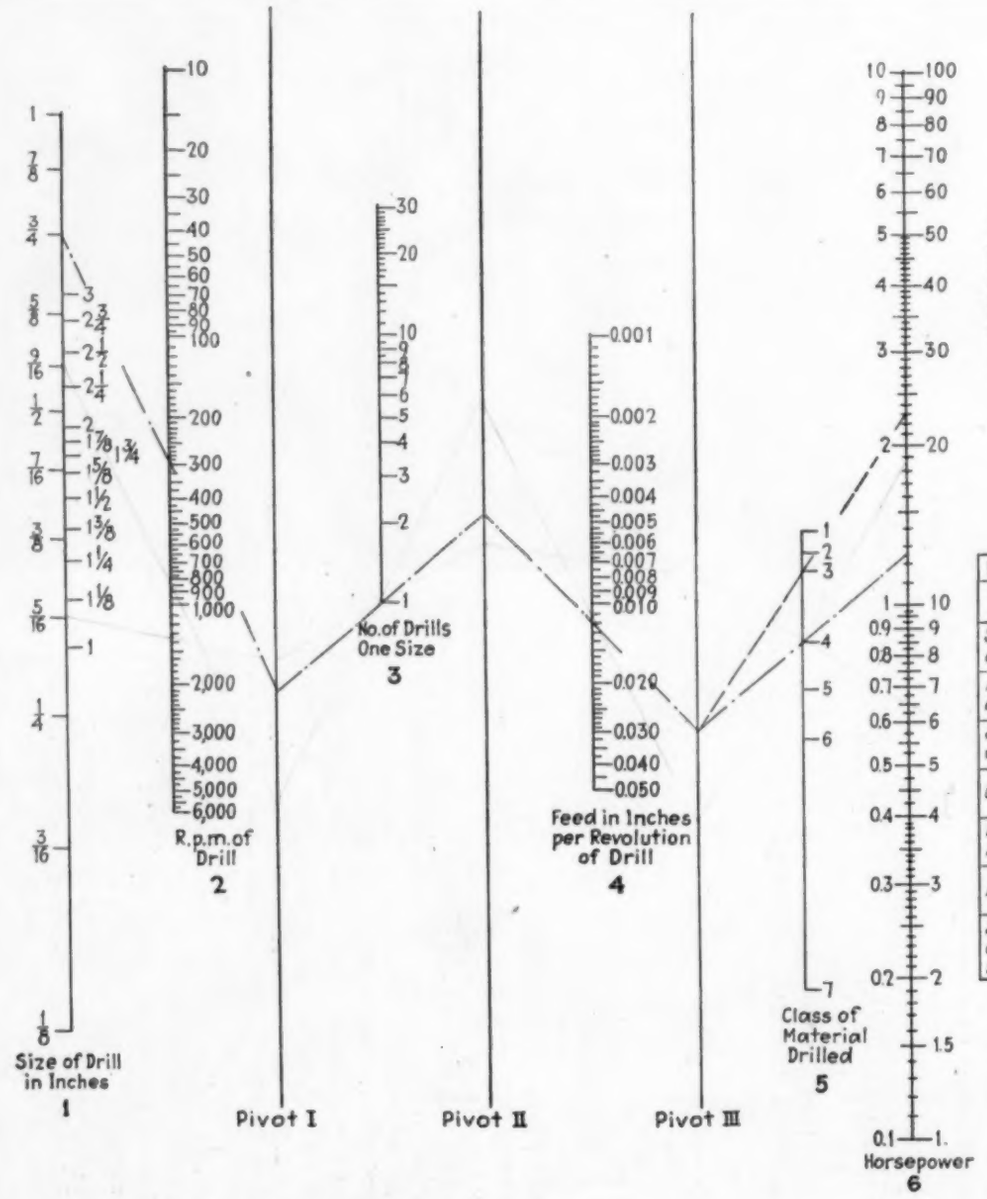
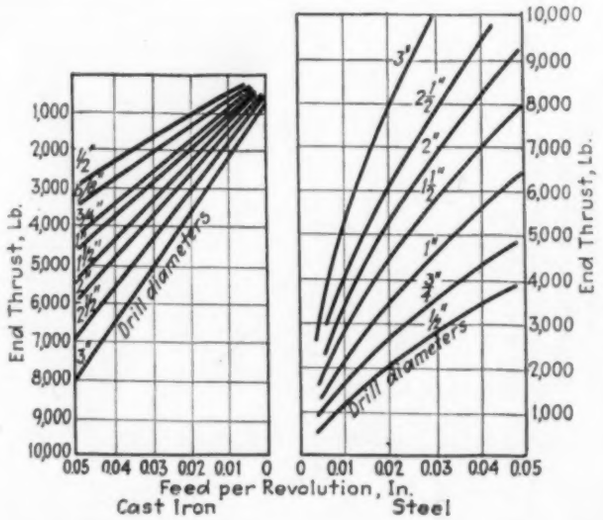
Reference Book Sheet

HORSEPOWER REQUIRED FOR DRILLING



Contributed by Paul R. Guirl



FACTOR FOR SCALE 5	
Material	Class No.
Steel as hard as can be drilled	1
Med. hard steel and forgings	2
Soft steel and wrought iron	3
Common cast iron	4
Brass and med. hard bronze	5
Aluminum	6
Soft fiber and compressed rawhide	7

THIS chart was prepared from the formula:

$$\text{Hp.} = \frac{D^2 \times N \times F \times S \times P}{W}$$

Where:

D = Diameter
N = Number of drills
F = Feed per revolution, in.
S = Speed in r.p.m.
P = Power factor, depending on material
W = Web factor, depending on diameter of drill

The factors W and P were determined from a number of tests and the chart will be found to be fairly accurate for drills in average condition. Sufficient allowance has been made for usual losses in transmission of power for both the driving of the spindles and feeding. If the feeding is done by hydraulic means some reduction can be made in the hp. requirements.

To find the hp. required for drilling, connect the size of drill (line 1) with r.p.m. (line 2) and register on pivot No. I. Connect this point with number of drills of one size (line 3) and register on pivot No. II. Connect this point with feed (line 4) in inches and register on pivot No. III. Connect this point with the number representing material (line 5) and read hp. on left-hand side of line 6, if size of drill on left-hand side of line 1 was used or on right-hand side of line 6, if size of drill of right-hand side of line No. 1 was used.

To find end thrust, enter the proper chart at the feed per revolution and trace upward to the curve representing the drill size. The intersection represents the value of end thrust in lb. and may be interpolated from the values given on the sides of the charts.

EDITORIALS

April 28, 1932

K. H. CONDIT • F. H. COLVIN

Editors

French Quotas

The usual deserts of a stranger mixing into a family quarrel seem to be accruing to the United States. On another page appears an account of the discriminatory commercial measures against American machinery imports that France has put into effect. An extreme example of these restrictions is the provision for putting into the hands of an interested private organization, the French Manufacturers' Association, the responsibility for deciding just what are "non-competitive machines."

While the general purpose is a high degree of protection for French industry, quotas are drawn definitely to favor products of German manufacture. It may cause some wonder as to why France's old enemy should be allowed special liberality. The answer, of course, is that Germany is a debtor and the United States is a creditor in respect to France. Imports from Germany, directly applicable to the reparations account, are permitted to enter outside the quota.

France recognizes the obvious fact that international debts cannot be paid unless balanced by trade. Apparently we have yet to learn that the insistence of some of our legislators against reduction of war debts is entirely academic until we make it possible for the nations indebted to us to sell their goods in this country.

Depression Ethics

The weight of the depression seems to be bearing down on ethics as well as on business and employment. Some managers have stooped to employment practices that have little of the ethical about them. They have taken advantage of the unemployed in a way that makes one's blood boil.

Here is an instance that was reported to us recently. A machinist, long out of work, paid a fat fee to an employment agency for a job. When he reported at the plant he was accepted and told that his job would be to run a surface grinder, and that the hours would be from 7 P.M. to 7 A.M.! And this with thousands of good men walking the streets.

The title of this editorial is "depression ethics." Possibly it should have been "depressed ethics."

High Cost Plants and Equipment

High cost plants in the steel industry are being closed down for indefinite periods. When there is not enough work for all the plants, it is but ordinary good business to concentrate it in the plants where there may be a chance of making a profit on it.

The big corporations in every branch of industry are considering similar concentration in their efficient units. The others will be abandoned, perhaps permanently. In some instances, such action has already been taken. In most of the others, it is unavoidable.

The single plant organization which is faced with drastic action in order to save the ship from foundering will find it worth while to consider combining departments where that is possible. If the equipment in any department is hopelessly obsolete, and there is no chance of raising the money to replace it, then the most profitable move may well be to contract out the work of that department.

Several machinery builders have found it good business to order the greater part of their machine work from efficient contract shops, particularly if their lots are small. They do the assembling and final fitting in their own plants, which represent only a small proportion of the fixed investment that would have been needed for a complete manufacturing unit. Under existing

conditions, this procedure is likely to be profitable. The contract shops have suffered along with every other enterprise and are hungry for work. Many of them are extremely well equipped and can easily do a more efficient job than can be done in a poorly equipped department of a manufacturing company.

High cost plants and obsolete equipment have no useful place today—if indeed they ever had.

• CHIPS •

Pill-swallowing time is here . . . and the pills get no sweeter by seasoning . . . Politicians' bitter dose, the economy bill, goes to House . . . a compromise between original Administration and Congressional plans . . . 11 per cent pay cut and Hoover program for bureau consolidation . . . clause to consolidate War and Navy departments, opposed by Administration, may confuse the issue . . . Meanwhile paring of departmental appropriation bills continues . . . though Secretary Wilbur claims flat percentage cuts are a great percentage hocus pocus . . . that they mean deficiency bills later.

Judging from the wry faces made, the bankers get the bitterest pill of all . . . although sugar-coated in the Senate committee, several ingredients besides Glass are most distasteful . . . divorcing of security affiliates and increased Reserve Board dominance particularly hard to take . . . Senate continues its bear-baiting tactics . . . uncovers several bullish bears . . . A. F. of L. head, Wililam Green, applauds President's 5-day week proposal . . . for industry as well as government . . . Veterans die hard and will be back again . . . meanwhile they may receive sop in loan interest cut . . . House votes $14,000,000 to modernize three battleships . . . $23,000,000 for new submarines and destroyers.

U. S. pride in mass production receives blow . . . "handicraft" says Comrade Pourmal referring to our dirigible construction . . . Soviet plans to enter field in big way . . . meanwhile Nizhni Novgorod Ford plant and Stalingrad tractor works are speeded . . . Development of Eastern Siberia part of new 5-year plan . . . Lamont Jr. says we spite ourselves by failure to recognize Russia.

No rich left in U. S. says Schwab . . . but Persian rug brings $62,000 at art auction . . . Spring drive of auto makers begins to yield results . . . reflected in increased steel mill activity . . . Manufacturers' protest against auto sales tax seconded by farmers . . . who own 5,000,000 cars and trucks . . . and whose voices are in tune with Capitol acoustics . . . Compilation of 432 industrial firms shows net profit 4.32 per cent of capital invested in 1931 . . . 1921 corresponding figure was 1.17 per cent . . . Wall Street marks time during Senate inquiry . . . but bonds continue strong on Reserve Board stimulus . . . William Allen White gives diagnosis of U. S. ailments . . . scared, angry, and asleep in enchanted spell . . . Despite 20 per cent drop in sales, 42 per cent of Chicago's manufacturers and wholesalers better 1931 profits.

Politics overshadow peace at Geneva . . . controversial topics avoided because of French May 1 elections . . . Herriot influence expected to increase . . . He advises U. S. to "let Europe alone." . . . But Italy enters spirit of the parley by halting naval building program scheduled for July 1 . . . Italian government loan oversubscribed four times in 12 hours . . . $200,000,000 thus made available forms tangible vote of confidence for Mussolini . . . Hitlerites win 162 seats in Prussian elections . . . Germany's jobless ranks drop 97,000 in two weeks . . . British tariff doubled as of April 26 . . . General levy increased from 10 to 20 per cent including machinery except agricultural which is set at 15 per cent . . . iron and steel 33-1/3 per cent . . . changes will affect European suppliers more than U. S. . . . Rift in British Cabinet may result . . . augmented by MacDonald's ill health . . . British budget balance omits war debt payments . . . hinges on other "ifs" . . . Vickers factory develops machine-gun rifle for British army . . . 450 shots per minute from light weapon . . . Japs to spend 4,600,000 yen on aircraft arsenal.

Metal trades told to resist inflation . . . high taxes, unemployment insurance assailed at association's annual meeting . . . Farrell honored by Iron and Steel Institute . . . American Locomotive head, W. H. Woodin, predicts railroads will buy in the fall . . . Willys to exercise control of Overland . . . but will retain Polish ambassadorship . . . United Action Drive to put a million to work reports 609,256 men employed . . . in 2,690 towns and cities.

· REGIONAL · REPORTS ·

WITH the Senate, the House and the President struggling over the budget and the tax bill, business during the past week was practically dormant as far as machine tools were concerned. The automotive industry is being watched closely and apparently there is reason to believe that some market for tools will develop from this source before so very long, but so far automobile manufacturers are sitting tight with what tools they have. The Navy continues to buy. Industrial plants don't need tools for anything at present, with the exception of pressed metal shops which, in the New York area, keep fairly active.

NEW YORK found the past week slightly better than the previous one with at least one dealer not too glum over results. New England took stock of its activity and found little to to take stock of. Out in Cincinnati both dealers and agents are working doggedly for sales. They report inquiries improving but do not speak so well of sales. Reports from Chicago duplicate those mentioned last week and except for one or two bits of activity the scene is ominously quiet. April proved the poorest month in two years for Detroit, where Ford still fails to get the V-8 into full production. The opportunity for business is there, but the stimulus necessary to shake it loose is lacking. In Indianapolis things are not much better. A few isolated outbreaks of sales have been recorded, but business is not what the trade expected.

NEW YORK—Slight improvement over last week reported by several dealers. Does not indicate any definite upward trend. Most items went to pressed metal shops which seem to keep fairly busy in this area. Sing Sing prison bought a shaper. Navy took a vertical boring mill and closed bids April 22 on list of 24 tools for cruisers. More lists out. Occasional reports of price concessions. Nothing to indicate immediate pick-up. With production schedules of industrial plants below half time in most cases, there is little call for machine tools.

NEW ENGLAND—Summary of orders for machine tools continues to present totals leaving much to be desired. Sentiment divided as regards future prospects. Ford and other automotive companies very conservative with orders now amounting to comparatively few units. No evidence any automobile manufacturer is equipping for prolonged period of heavy production. Accessory manufacturers have orders on which release is awaited. The Navy placed additional orders. Other Navy orders expected shortly, including one for dozen lathes.

CINCINNATI—Digging by machine-tool manufacturers and selling agents in market-mine producing little in the way of ore. Fair number of inquiries being received, but rarely one results in sale. Business booked came from scattered miscellaneous users needing single tools.

CHICAGO—Another extremely dull week with no material change looked for in near future. Westinghouse Elevator straggling purchases furnished only bright spot. Increased sales of job lot steel and of small tools indicate some increase in industrial activity. International Harvester Co. about to put into operation new line for making mower frames. Two firms got most of business, all special purpose, heavy, fast, expensive.

DETROIT—April one of poorest months ever experienced by trade here. Sales exceedingly rare and the few deals reported were small. Ford making some small purchases and Chevrolet reported buying a little drilling equipment. Ford not yet in heavy production on new car. Machinery dealers believe that soon or late he will require good deal of new equipment, which ought to stimulate market perceptibly. At least three large manufacturers of automobiles plan important changes but details are lacking. One large plant shut down last week. Will remain closed until June. Plymouth assembling 1,200 cars per day. Expects to maintain schedule at least through next few months. Tooling for new model of one auto manufacturer incomplete. If plant reaches half of capacity, orders must be released. In general feeling is pessimistic. No one seems willing to buy anything and state of uncertainty prevails.

INDIANAPOLIS—While some isolated pieces of machinery and machine tools are being sold, business is not what trade expected. Automobile trade promised big things, but none of the factories seem to be getting into production. Waiting to see what spring and early summer demand is to be. Demand from steel industry continues dull. Nothing indicates any marked improvement just now. Some plants making inquiries. No business reported yet from railroads. Road contractors not buying nearly in proportion to volume of contracts awarded. Successful contractors, rather than buy new equipment, rent equipment from unsuccessful. Some sales to farm implement factories, where business is better than year ago.

MATERIAL TRENDS AND PRICES

A slight pick-up in demand, which developed during the last week in steel bars, tin plates, automotive sheets, strips and castings, has raised the rate of mill operations 1½ points, to 22½ per cent of capacity. In the warehouse trade, foreign steel is making considerable headway against domestic material. Prices have changed little from Apr. 15 levels, the principal fluctuations being slight advances in copper and tin and a decline in zinc. Scrap of all descriptions remains unchanged.

(All prices as of April 22, 1932)

IRON AND STEEL

Pig Iron —	Current	Mo. Ago	Yr. Ago
Birmingham, No. 2, Fdry., per gross ton	$11.00	$11.00	$12.00
Buffalo, No. 2, Fdry., per gross ton	16.00	16.00	17.50
Heavy Melting Steel Scrap — Pittsburgh consuming point, No. 1, per gross ton	10.25	10.00	12.25
Furnace Coke — Connellsville, per net ton	2.25	2.25	2.50
Foundry Coke — Connellsville, per net ton	3.25	3.25	3.25
Steel Shapes — Pittsburgh, base, per 100 lb	1.50@1.60	1.50	1.65

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Iron Machinery Castings — Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight, 275 lb:

Chicago	4.62½	Cleveland	4.50
Cincinnati	4.35	Detroit	4.00
New York	4.75		

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Steel Sheets — Prices in cents per lb., del. from warehouse stock (except at Pittsburgh) in lots of 401 to 999 lb., ordered and released for shipment at one time:

	Pitts. Mill	Chicago	Cleveland	New York
Hot-rolled, No. 10	1.55	3.20	3.00	3.00
Hot-rolled, No. 24*	2.20	3.55	3.25	3.50
Galvanized, No. 24	2.85	4.10	3.75	4.00

*Annealed

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Seamless Steel Tubing — Cold-drawn mechanical tubing, round, .10 to .30 carbon, in lots of less than 100 ft. or 100 lb., net, at N. Y. warehouse:

Thickness of Wall		Outside Dia. in Inches					
		⅛	¼	½	¾	1	1½	1½
Inches	B.w.g.	Price per Foot						
.035	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23

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Shapes, Plates, Bars, Etc. — Warehouse base prices in cents per lb., del. in lots of 401 to 999 lb., ordered and released for shipment at one time:

	New York	Cleveland	Chicago
Bands	3.40	3.00	2.95
Bars, soft steel	3.10	2.75	2.75
Cold fin., flat or square	3.80	3.60	3.60
Cold fin., round or hexagon	3.30	3.10	3.10
Cold rolled strips	4.95	5.95	5.50
Floor plates	4.85	5.00	5.00
Hoops	3.75	3.55	3.50
Rivets	4.00	3.30	4.00
Shapes	3.10	2.95	3.00
Spring steel	4.00	4.00	4.00
Tank plates	3.10	2.95	3.00

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Stainless Steel — Hot-rolled bars, base, Pittsburgh, 0.12 per cent carbon, cents per lb.:

Chromium		Chromium	
15% and under	19.00	18 to 23%	23.00
15 to 18%	20.50	23 to 30%	28.00

Bolts and Nuts — Discount from list, f.o.b. mills, Birmingham, Chicago, Cleveland and Pittsburgh, on bolts (except stove), nuts, and lag screws, mill lots 75%

NON-FERROUS METALS

Prices following are in cents per lb. for mill shipments in carlots:	
Aluminum ingots 99%, N. Y.	23.30
Copper, electrolytic, Conn	6.00
Copper wire, base, Chicago and Cleveland	8.62½
Copper wire, base, N. Y.	8.50
Lead, pigs, E. St. Louis	2.90
Tin, Straits, pigs, spot, N. Y.	18.87½
Zinc, slabs, E. St. Louis	2.75
Prices following are in cents per lb., base, N. Y., Chi. and Cleve.:	
Brass rods, high	10.25
Brass sheets, high	12.50
Brass tubing, high	15.75
Copper, drawn round	12.87½
Copper sheets	15.37½
Copper tubing	14.87½
Prices following are in cents per lb., del. from N. Y. warehouse:	
Babbitt, anti-friction, general service	27.00
Babbitt, com'l, intermediate grade	32.75
Babbitt, genuine, highest grade	41.50
Solder, bar	15.75
Prices following are in cents per lb., base, Huntington, W. Va.:	
Monel metal rods, hot rolled	35.00
Monel metal sheets, full finished	42.00
Monel metal tubing, seamless	65.00
Nickel rods, hot rolled	45.00
Nickel sheets, full finished	52.00
Nickel tubing, seamless	75.00

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Scrap Non-Ferrous Metals — Dealers' purchasing prices in cents per lb., f.o.b. cars:

	New York	Cleveland	Chicago
Heavy yellow brass	2.00	2.00	1.75
Light brass	1.50	1.25	1.37½
No. 1 rod-brass turnings	2.25	2.25	1.62½
Heavy copper	4.00	3.00	2.75
Light copper	3.25	2.75	2.37½

SHOP SUPPLIES

(Prices at warehouse)	New York	Cleveland	Chicago
Abrasive disks, aluminum oxide No. 50 grain, cloth, 6-in. dia., X weight, per 100	$4.37	$4.59	$4.59
Belting, leather, heavy	40–5%	40–5%	40–5%
Belting, rubber, trans., Grade 1	60–10–10%	60–10%	60–10%

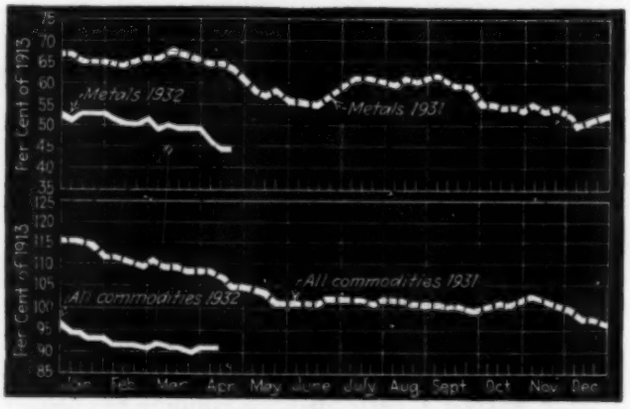
Lumber — Per M ft., b.m., 12–16 ft. lengths, delivered, N. Y.

Crating — Southern pine:

1x4-in., sq. ed. ..... $27.00 1x6-in. $24.00

Skids — Spruce:

2x4-in. .$35.00 3x4-in. .$35.00 4x6-in. .$37.00 6x6-in. .$50.00

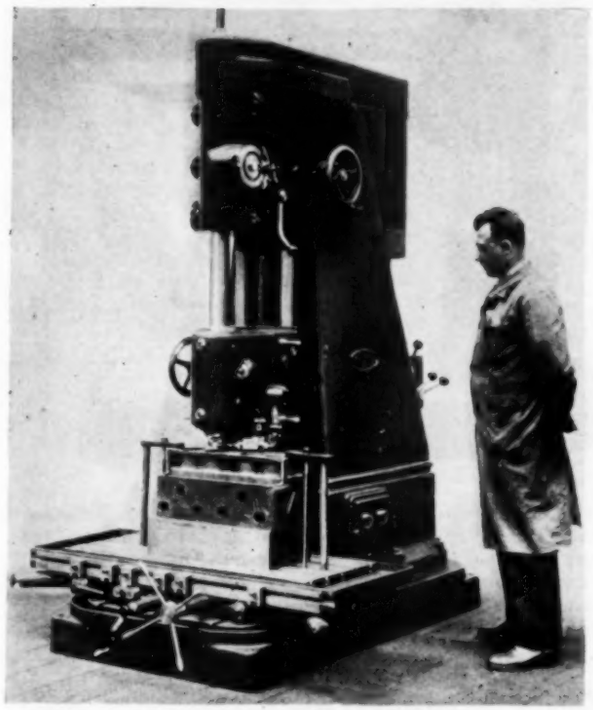

Per Cent of 1913
Metals 1932
Metals 1931
All commodities 1931
All commodities 1932
Jan. Feb. Mar. Apr. May June July Aug. Sept Oct Nov Dec

Price Movements Week by Week

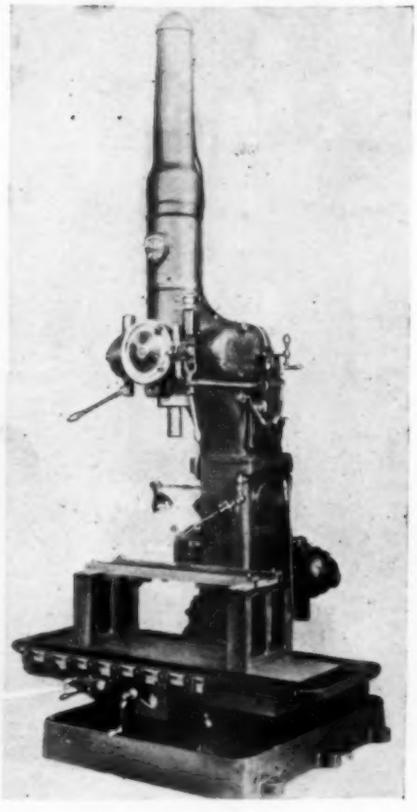
Average Price of Raw Metals: Pig Iron, Billet Steel, Copper, Tin, Lead, Zinc—American Machinist
Seventy-Four Commodities Index—The Annalist

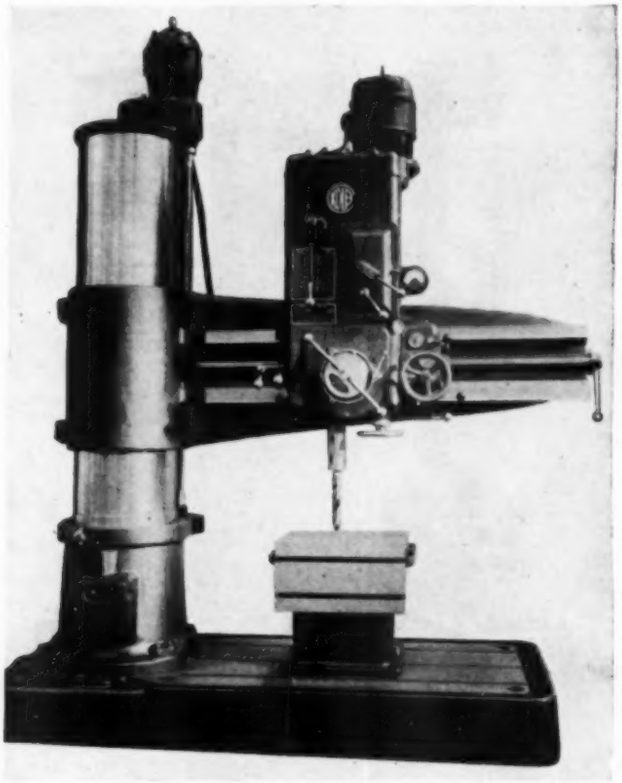
Metal-Working Machines at The 1932 Leipzig Spring Fair

In this second of the series of articles on new machine tools and metal-working equipment shown at the Leipzig Spring Technical Fair are pictured drills and metal-cutting saws



Above—This semi-automatic machine for boring cylinders accurately in cast iron, steel, bronze or aluminum has unusually large working clearance between spindle and table. Diameter to be bored is set on the tool by micrometer screw and minimiter; boring is to tolerances of 0.0004 in. for roundness, alignment and size in one operation. Maximum metal removed is 0.03 to 0.04 in. Cutting speed in cast iron is 450 ft. per min., in copper alloys 1,300 ft. per min. Eight feeds, 0.0004 to 0.004 in. are provided, with speeds of 260 to 3,050 r.p.m. Shown by Ernst Krause & Cie, Vienna

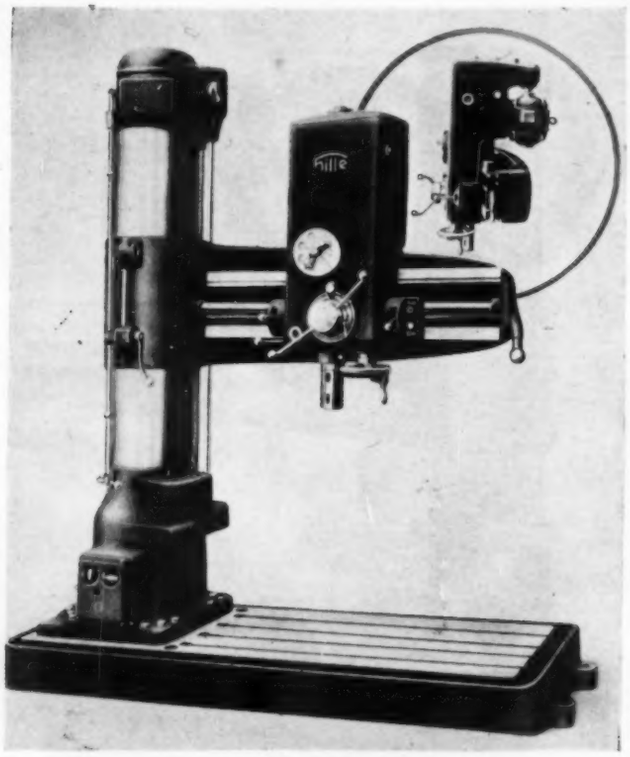


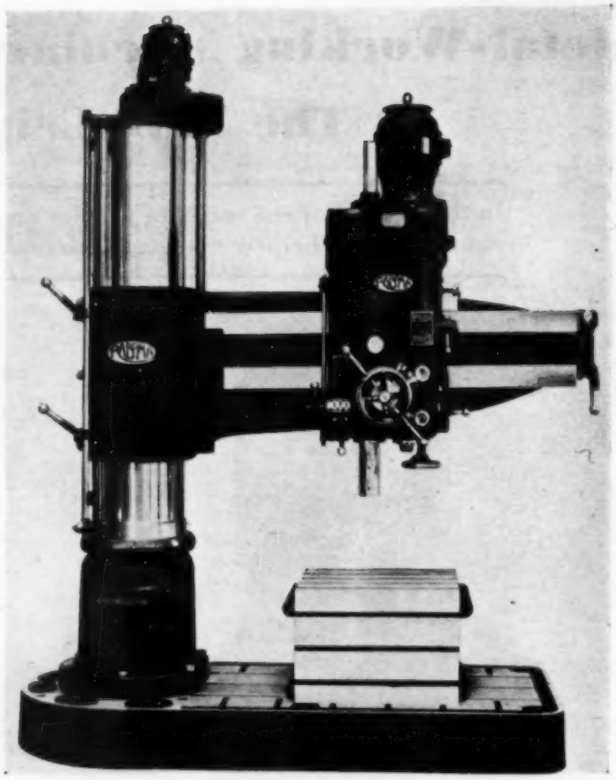


Above—This high-power radial of the series shown by Hermann Kolb, Cologne, has 60-in. reach, drills 2¼ in. in diameter through steel, has 24 speeds from 35 to 1,535 r.p.m. Feeds range from 0.005 in. to 0.1 in. per rev. Time for set-up is shortened by a semi-automatic locking device which clamps carriage, arm and column simultaneously. This locking device is interlocked with the gearing for rapid traverse of the head on the arm

Left—Rough boring and reboring of cylinders to accuracies of 0.0004 in. in any direction is claimed with this hydraulically driven unit. Feed is not applied to the ball bearing spindle in its sleeve, but to a saddle guided along rectangular ways. This aids in maintaining accuracy. Feed motion is semiautomatic and is planned either for multi-point or single-point tools with their attendant feed and speed differences. Shown by Hille Werke, Dresden

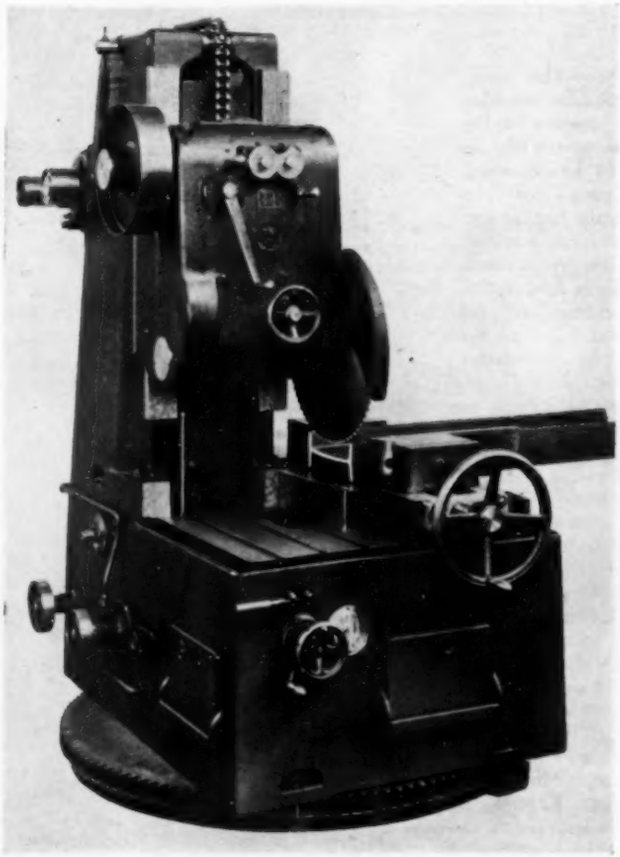
Below—Standard bracket-mounted motors replace the usual flange-mounted motors on this radial drill, made by Hille Werke, because flange-mounted types are usually more difficult to replace in case of sudden breakage. The driving motor is mounted on the back of the saddle, as shown in the insert, while a horizontal motor for arm travel is mounted on top of the column. The driving motor operates in one direction only, thus avoiding distracting the attention of the operator while the machine is running. Speeds range up to 2,200 r.p.m. Controls are grouped at the saddle and are of the interlocking type, with some motions controlled by pushbutton. Saddle and sleeve are locked simultaneously by a single lever





Above—An extremely simplified radial shown by Raboma, Berlin. One lever makes both speed and feed changes, replacing the usual number dispersed over the head. All levers are arranged to operate vertically, either up or down, thus avoiding horizontal pushing or pulling on the arm. Eighteen speeds and 18 feeds in geometric progression are provided

Right—Vertical cold-sawing machine with oil pressure feed and clamping device. A low and clear worktable, a variety of sections, and the swiveling clamp opens wide. Drive is by electric motor through an expansion-ring clutch controlled from the front of the machine. The saw carriage, which feeds vertically instead of horizontally, also carries a helical gear drive and provides automatic lubrication. Four cutting speeds are obtainable through sliding gears, and feeds are of course infinite in number and arranged to provide more rapid feed when cutting thinner sections. Feed pressure is indicated on a manometer. Shown by Gustav Wagner, Reutlingen



Miter-cut cold-sawing machine shown by Wagner, which is designed for cutting all types of profiled sections. Saw feed is hydraulic. The saw head swivels and is driven by a worm and wheel. Designed for cutting metal window and door sections originally, this machine is said to have been sold to the Soviet in large quantities

Attacks on Government Extravagance Feature Metal Trades Meeting

Speakers Infer Waste Must Cease and Stability of Government be Re-established Before Business Can Come Back

UNDER the evident impression that an open season on Congressmen and other government officials had been declared, most of the speakers at the National Trades Association meeting turned loose the heavy artillery of their oratory against governmental extravagance and waste. The meeting was held at the Hotel Commodore in New York on April 20.

COL. ROBERT R. MCCORMICK, editor and publisher of the Chicago *Tribune*, whose remarks were broadcast over WOR, delivered a diatribe on government waste in which he likened the abuse of the taxing power to legalized larceny. He pointed out that "we have reached the extraordinary situation where the ownership of property has become a liability, not an asset." In conclusion he called attention to a group of citizens in Aurora, Ill., who recognize the danger of all sorts of special interest groups, log-rolling for this or that privilege, and who deplore the absence of any group that devotes its activities solely to the public welfare. These people propose a nation-wide organization with this aim in mind, and they suggest that it be called The Patriots.

Little States Rob Big

Much the same theme was the basis for the dinner address by REP. JAS. M. BECK of Pennsylvania. He accused the Congressman of the small states of voting for state aid appropriations, the funds for which would come from the large industrial states. He gave figures to show that the small states get back from 1½ to 3 times the amount they contribute to the Federal Treasury. New York State, on the other hand, got back in 1929, less than 1 per cent of the amount it contributed.

An enlightening picture of "Russia Today" was drawn by PROF. W. ELMER EKBLAW, Clark University, a member of an investigating commission that has recently studied Russia's agricultural problem. He explained that Russia is short of all the important minerals except platinum, manganese and petroleum, and that the famous magnetic mountain of Magnitogorsk has turned out to be but a shell of ore that will last but 20 years. Eighty-seven per cent of the population is concentrated in 15 per cent of the area because the rest of the country is unable to produce the crops to feed them, either because of cold and acid soils in the north or inadequate rainfall in the south. The bumper wheat crop which upset world markets recently was the result of the greatest rainfall in over 60 years, and is unlikely to be repeated. The present industrialization experiment differs from similar experiments made by Peter the Great and Catherine II only in the type of autocracy that directs it. Prof. Ekblaw believes that it will fail as those experiments failed because of the mongrel civilization of Russia, neither wholly Occidental nor quite Oriental because of its position between these two major cultural regions.

At luncheon, GEORGE E. SOKOLSKY spoke on the Sino-Japanese situation, portraying vividly the Japanese consolidation of the railroads of Manchuria which has been so rapidly accomplished that in case of war with the Soviets the fighting will be on Siberian soil. He maintained that the U. S. has a perfect right to insist on the open door policy in China and Manchuria and to protest if an attempt is made to close that door. He closed by condemning decisively the bill to withdraw from the Philippines which recently passed the house.

WALKER D. HINES, speaking on the anti-trust laws, expressed the opinion that modifying legislation would have little chance of favorable action just now, but that there is evidence the U. S. Supreme Court will interpret the law to fit the present emergency conditions in many industries.

DR. CHARLES PROSSER, Director of the Dunwoody Institute, Milwaukee, and HAROLD S. FALK, The Falk Corporation, chairman of the committee on industrial education, discussed the changing trends in the field of industrial education, and told of the work of this committee.

JAMES A. EMERY, of Washington, spoke on the subject "Congress and Your Industry," and urged his hearers to keep in touch with their Congressmen. HENRY D. SHARPE, Brown & Sharpe Mfg. Co., read a paper on the part played by the Association in its industry in the past, and on the prospects for constructive activity in the future.

PHILIP M. MORGAN, Morgan Construction Co., chairman of the committee on prevention of industrial accidents, reported that in spite of much progress by his committee there were still plants where the most obvious industrial hazards are permitted. He said the committee's work is financially justified by the large savings returned to member companies through reduction of accident claims. PROF. RALPH S. MERIAM, Harvard University, pointed out in some detail the unworkable nature of state-directed unemployment insurance, and maintained that mechanization of industry and agriculture must continue if standards of living are to be improved. For the committee on industrial relations, GEO. E. RANDLES, Foote-Burt Co., reported what is being done by companies in the metal-working field to tide employees over the emergency.

FRED I. KENT, Bankers Trust Co., made a strong defense of the attitude of the bankers during the depression, pleaded against any form of currency inflation, and praised the legislation creating the Reconstruction Finance Corporation, and the Glass-Steagall bill.

The following officers were elected: JACOB D. COX, Cleveland, president; ALEXANDER SELLERS, Philadelphia, 1st vice-president; CHARLES H. STRAWBRIDGE, Chicago, 2nd vice-president. Councillors elected were: J. G. BENEDICT, Waynesboro, the retiring president; E. C. BAYERLEIN, Milwaukee; HAROLD EDWARDS, Syracuse; M. W. PICKERING, Ansonia; ARTHUR H. STARRETT, Athol; and A. H. TIMMERMANN, St. Louis.

Boeing Airplane Reorganizes Plant

The plant of the Boeing Airplane Co., Seattle, Wash., has recently been reorganized and three new shops in the production section have been created. The new shops include: control surface shop, created to manufacture the control surfaces formerly produced in the sheet metal department; body shop, organized to handle the construction of all airplane bodies, irrespective of type of construction; and the bench shop, handling the bench work formerly conducted in the machine shop.

Another feature of the reorganization was the allocation of all wing construction, wood and metal, to an expanded wing shop. In the past, wood wings have been constructed in the wink shop, while metal wings were fabricated in the sheet metal department.

Foremen of the new departments include: ALBERT WALLOCK, control surface shop; LEO BUTLER, body shop; L. W. VAN DYKE, bench shop, and E. ORTHEL, wing assembly.

J. H. Q. DOHSE has been appointed assistant superintendent of the Boeing plant. Mr. Dohse, who was formerly production engineer in the engineering department, will perfect liaison between the engineering and production departments.

France Continues to Throttle American Machine Tool Imports

PARIS—In a spirit of retaliation to the American elastic tariff, France, within the past few weeks, by a system of quotas and contingents, has shown a very evident animosity against American manufactures in general and machine tools, electrical appliances, agricultural machinery and tools in particular.

So acute has the situation become with respect to machinery and tools that both quantitative and qualitative import restrictions have made necessary direct protest by the American Embassy in Paris and the American Chamber of Commerce for France, to which has been added that of several French firms importing American tools and machinery.

The bulk of American machine tools imported are of the high-production class, needed and appreciated by French industry. Restriction, therefore, in the long run is bound to prove a boomerang. Decline in imports was already considerable during the past year. All import classifications, according to French figures, had fallen 20 per cent in 1931; machinery alone, 42 per cent; machine tools, 47 per cent.

As an example of how the quota scheme is working, that granted Germany, applying from March 1 to June 30 of the present year, permits the entry of 146 metric tons of machine tools; that applicable to the United States, 21 tons. Other units in this same category from Germany, if for the reparations account, are not included in the quota. The quota allowed on drop hammers from all countries, except Germany and Great Britain, but including the United States, is 42 tons, conceivably the weight of a single unit. Still more horrible examples:

	German Quota	United States Quota
Printing machinery	266 metric tons	109 metric tons
Machinery parts.....	700 metric tons	129 metric tons
Measuring instruments, Calibres, Scales etc.....	609 metric tons	127 metric tons
Pneumatic tools....	20 metric tons	7 metric tons
Tools, unclassified..	103 metric tons	57 metric tons
Drills: value in francs....	1,286,651	771,868

There is apparently no valid explanation for this action unless it be that France is putting into application a preconceived policy of restricting all imports as much as possible, beginning with those which hit the seller the hardest as a warning of more to come if conditions seemingly justify. Such action is legitimate, even as a reply to Section 338 of the United States tariff of 1930. But the time chosen and the method of its working are open to criticism, according to opinions expressed by all American trade representatives here.

Monsieur Paul David, French Counsellor for Foreign Trade, replied to a Chamber of Commerce committee that there was no discrimination "because all countries are treated on the same footing." He added, however, that "the excesses of American protectionism were the determining issues of the trade crisis."

Up to March 17 of the present year, American machine tools were not included in any quota lists which had been issued but it was not long before French and German interests got together to fix a working basis for these specific quotas which resulted in strengthening the Franco-German commercial bond.

A special provision has been dragged in, referring vaguely to what is termed "non-competitive machines." For these, import licenses are to be granted through the French Machine Manufacturers' Association, a group of metal transforming firms and plants whose output, for a large part, competes directly with American machinery imports. This trade association, which now finds its scope enlarged by the inclusion of a usurped government function, is to be supplied with the name of the ultimate purchaser of the unit in question and the ultimate sale price. This means furnishing a copy of the American maker's pricate records and takes the clearing of the goods through the import barrier from government control and subjects them to the private pleasure of non-officialdom. The plan seems hardly tenable to American interests in Paris and is being fought by all possible means.

As to the methods by which the actual quotas were arrived at, United States interests, or those of importers of machinery and tools from the United States, were not consulted before the actual lining up of the conditions prescribed. Germany, on the other hand, was consulted, especially with respect to machine tools. Even certain other countries were consulted where other import quotas than those mentioned were concerned, but in no case the United States.

The first instance, three or four years ago, was the matter of movie films, but the coming of the talkies settled that. Later there was the question of fresh fruits and the pretended fear of the San José scale. Other countries, buyers of the same products, made no objections and representations in the proper French quarter by United States authorities eased that situation. Next, radio apparatus was on the carpet and its position is not yet free from aggravation. Machine tools, the latest victims, have been dogged for some weeks but up to this writing nothing has been accomplished towards securing them justice which was so readily obtained for Santa Clara prunes and Oregon apples. Even steel sheets for automobile bodies are down in the general quota for 200 metric tons per month, of which Germany has an apportionment of 124 tons, the United States of but 60 tons and Great Britain but 12 tons. A protest has already been registered by the latter country.

The final outcome, readjustment, settlement or whatever it happens to be, is still problematical. The American Chamber of Commerce for France, on March 31, passed a formidable and lengthy resolution sent as a protest to the French government. Of the dozen articles, perhaps the most emphatic was that which calls attention to the "shrunken quotas applied to the United

THE BUSINESS WEEK

April 27, 1932

There is a slight, belated touch of spring in some of the recent business statistics, in spite of the solid frost of fear and defeatism in the financial atmosphere. In most of the important indicators, allowing for the usual seasonal factors, the discouraging decline of recent months seems to have stopped, and in some a slight improvement has appeared. Steel activity, especially in the independent concerns, is being sustained by a slowly rising stream of automotive orders. Electric power production appears to be straightening out to a stabilization level, and building contracts likewise are supported by some improvement in public construction work as the season opens. Merchandise freight movement and check payments have picked up a bit, possibly reflecting some spring stimulus in retail trade. Federal Reserve efforts to force credit expansion and checkmate danger of other direct inflationary devices continue encouragingly aggressive, but member bank response is still slow. Reserves and deposits are piling up in the leading centers under the influence of large-scale open-market operations, but the member banks still seem reluctant to give steady and decisive support to security markets in face of declining confidence and fiscal uncertainties, and credit contraction continues. But basic banking conditions are unquestionably better, and seem to be establishing a bottom on which some business improvement is possible if political disturbance can be avoided and the depressive insanity of the public can be overcome.

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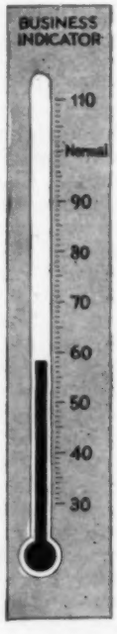

States which are not those applied to other countries." It goes on to say that, "the United States has been discriminated against in such a manner as to place United States trade at a disadvantage compared with that of other foreign countries. . . . There is great iniquity in the situation and imperative need of relief."

As a matter of record it is worth noting that Great Britain has also felt the pinch, though to a lesser degree, and through its various organisms is also protesting. British manufacturers of radio sets are chiefly affected, their quota for the next quarter being only 15 tons; that of Holland, 215 tons; Germany, 102 tons; the United States, 20 tons.

One other handicap, which indicates the principles upon which foreign traders will henceforth be permitted to do business in France, is the abolition of the old single sales tax of 2 per cent, now replaced by a super-tax of 2 per cent on imports of raw materials, 4 per cent on semi-finished products, and 6 per cent on finished products.

Claudel, Castle Discuss Quotas

Washington, D. C. — The friction which has arisen between American exporters and French officials over the application of French import quotas on American goods, was discussed recently by Ambassador Paul Claudel of France and William R. Castle, Acting Secretary of State.

Charges that the French quotas actively discriminate against the United States have been lodged and have been under consideration for several weeks at conferences between State, Treasury and Commerce Department officials. Ambassador Walter E. Edge at Paris has also been dealing actively with the situation but as yet no appreciable headway has been made toward remedy.

Foundry Equipment Orders

Foundry Equipment Manufacturers Association reports group orders for March at 27.9, based on 100 for average monthly shipments during the years 1922-23-24. Net orders for the month stood at 27.5, shipments at 38.3, and unfilled orders at 32.1. Three months' average of gross orders is set at 27.1.

In Receivership

R. Hoe & Co., printing press manufacturer, has been placed in receivership with HERRY R. SWARTZ, president of the company, and the Irving Trust Co., appointed receivers. Liabilities $7,000,000 and assets $12,000,000, approximately.

• BUSINESS ITEMS •

American Radiator Co. plant at E. 47th St., Bayonne, N. J., has been closed for an indefinite period because of damage to machinery in the power house, according to officials of the company. Extensive repairs that will take considerable time are said to be necessary. The plant employed 800.

Reliance Electric & Engineering Co., Cleveland, Ohio, manufacturer of a.c. and d.c. motors, has established a sales branch in Grand Rapids, Mich. MARSHALL T. BALL, in charge of the branch, will be located at 208 Fuller Ave. S.E., Grand Rapids.

Pacific Tractor Equipment Corp., manufacturer of pumps and auxiliary equipment, has established a plant at 905 18th St., Oakland, Calif. The office and headquarters are located at 916 Financial Center Bldg., in that city. J. F. KNAPP is president, and F. E. HIMMEL, secretary-treasurer.

To cover the manufacturing plants located in southeastern Ohio and southwestern Pennsylvania, Barber-Colman Co., Rockford, Ill., has established an office in Pittsburgh, for handling the sale of milling cutters, hobs, reamers, and allied machinery. The office is in charge of WM. G. TAPHORN, formerly of the Chicago sales office.

New England Screw Co., Boston, Mass., has been licensed by Dardelet Threadlock Corp. to manufacture and sell bolts, nuts, and screws with Dardelet self-locking thread.

Kron Co., formerly American Kron Scale Co. of New York, now located in Bridgeport, Conn., manufacturer of industrial scales, has appointed GEORGE A. NICHOLS as New York district manager. Mr. Nichols will be located at 801 Chrysler Bldg.

Fuller & Johnson Mfg. Co., Madison, Wis., maker of gasoline and gerosene engines, is offering its machinery and other equipment for sale at public auction April 28.

Eastman Kodak Co. has purchased the camera works of DR. AUGUST NAGEL, at Stuttgart, Germany. Although the purchase was made last December it was not revealed until last week. The German plant, which produces cameras of the highest grade, will continue under the supervision of Dr. Nagel, and will operate as a branch of Kodak Aktiengesellschaft, Berlin, subsidiary of Eastman Kodak.

Metropolitan Body Co., Bridgeport, Conn., has been placed in temporary receivership following a petition of several creditors. Another petition filed by WILLIAM CARLSON, president of the company, also asks for a receiver and an order for dissolution. The company has a plant on Grand St., and also holds a temporary lease on part of Locomobile plant where it has been manufacturing automobile bodies for the Government.

Columbia Phonograph Co., Inc., has announced the election of H. E. WARD, of Chicago, as president, and H. CURTISS ABBOTT, of New York, as vice-president in charge of sales, merchandising and advertising. F. J. AMES remains treasurer. Messrs. Ward and Abbott also were elected directors.

Canadian Television, Ltd., has been incorporated under the laws of Canada to engage in the manufacture of television transmitting apparatus for broadcasting stations and construction and sale of television receiving equipment for homes and theaters.

Incorporation papers have been filed for Duplex Mfg. & Foundry Co., Elyria, Ohio, following approval, in a special meeting of the stockholders of Jaeger Machine Co., Columbus, Ohio, of the sale of property of Duplex Foundry division of Jaeger Company to LLOYD BROWN and associates. The Duplex division at Elyria was acquired by the Jaeger concern in 1929 when that company took over Lakewood Engineering Co., Cleveland.

Articles of incorporation have been filed with the secretary of state of Indiana by H. W. Taylor Co., Inc., Indianapolis, formed to manufacture road machinery and contractors' equipment and supplies. The board of directors is composed of H. W. TAYLOR, EDITH D. TAYLOR and ROSE KOOR.

Orville Simpson Co., Cincinnati, has announced the appointment of Cleveland Duplex Machinery, Inc., Penton Bldg., Cleveland, to represent them in northeastern Ohio territory. The Orville company manufactures screeners for product separation.

Perfect Circle Co. has announced plans for a manufacturing plant to be located in Toronto, Ont. Supervision of the plant will be in charge of ROBERT M. THOMAS, formerly of Thomas Mfg. Co., Newcastle, Ind. The plant is expected to be in operation in 60 days with a capacity of 100,000 piston rings a month.

Managerial Staffs Consolidated

The managerial staffs of Westinghouse Air Brake Co. and Union Switch & Signal Co. have been consolidated with A. L. HUMPHREY, president of Westinghouse and chairman of the board of the Signal company as executive director of the consolidated organization. CHARLES A. ROWAN, executive vice-president and a director of Westinghouse, has been elected president of that company and vice-chairman of the board of the Signal com-

pany. G. A. BLACKMORE, president and general manager of the Signal company, has been made a director, vice-president and general manager of Westinghouse, and S. G. DOWNS, vice-president of the latter, has been made a director of the Signal company. This makes the boards identical.

No Change In Taper Standards

Technical Committee No. 3 A.S.M.E. for the Standardization of Machine Tapers, after considering all phases of the problem, has decided not to recommend any changes at present. It recognizes that the requirements for taper shanks of drills, and those for milling cutters and other tools are not the same and the committee is now considering later developments in sharp tapers with positive holding devices for tools of this kind. The sharp taper of 3½ in. per ft. or 16 deg. 36 min. included angle and with a cam lock worked out by leading milling machine engineers, is to be studied by a sub-group of the committee. For milling cutters and similar tools, this seems to have decided advantages. It can also be used to drive either straight or taper shank drills by means of adapters and provides for a quick change of tools.

• PERSONALS •

H. T. AMES, formerly vice-president and sales and advertising manager of Duesenberg, Inc., Indianapolis, has been named president of the company succeeding E. L. CORD.

M. T. LOTHROP has resigned as president and director of Timken Roller Bearing Co. H. H. TIMKEN, chairman of the board, was elected president in addition, and F. J. GRIFFITHS, president of Timken Steel & Tube Co., a subsidiary, was elected to the vacant directorship. Other directors were re-elected.

WALTER S. FOSTER has been elected a director of Reo Motor Car Co., Lansing, Mich., succeeding WILLIAM ROBERT WILSON, resigned.

COL. GEORGE A. GREEN, formerly vice-president in charge of engineering of General Motors Truck Co., is now vice-president in charge of operations.

WILLIAM S. GRAHAM has retired as vice-president in charge of manufacturing of the Hupp Motor Car Corp.

EDWARD H. KOCHER has been elected president and general manager of Bijur Lubricating Corp.

F. W. MCINTYRE, vice-president and sales manager of Reed-Prentice Co., Worcester, Mass., has been elected general manager.

F. K. SIMMONS, formerly vice-president and general manager of Henry & Wright Mfg. Co., Hartford, Conn., has been elected president succeeding RICHARD HARTE.

JOHN R. TURNER has been elected a director of American Machine & Foundry Co., Brooklyn, N. Y., and its subsidiary, International Cigar Machine Co.

Activities

A. E. GROVER will be the principal speaker at the cost session of a joint convention of Gray Iron Institute and A.F.A. on "Foundry Costs," May 3, in Detroit. Mr. Grover, who has recently been engaged to carry on the cost work of Gray Iron Institute, is well known for his cost activities in connection with the National Machine Tool Builders Association and for his work with various individual foundries. His articles on manufacturing aspects of cost accounting, which have appeared from time to time in *American Machinist*, have been valuable additions to the available information on this subject.

WILLIAM A. IRVIN, newly elected president of United States Steel Corp., has been elected a director of American Iron and Steel Institute.

S. E. JAMIESON, manager of the business and technical division, Graham-Paige Motors Corp., has resigned.

EDWARD L. RYERSON, JR., president, Joseph T. Ryerson & Son, Inc., Chicago, was one of four Yale University graduates nominated by Illinois alumni board for alumni fellow of Yale corporation.

A. U. WIDMAN, works manager, Cadillac Motor Car Co., Detroit, has resigned effective May 1 after ten years with the company.

KARL GROSS, an authority on lead burning, lead coating and homogeneous lead work, has been added to the staff of Northern Blower Co., W. 65th St., Cleveland, Ohio.

American Machinery and Tools Institute, at the annual meeting in Chicago, April 19, elected officers and directors as follows: W. R. MAU, Vanadium Alloys Steel Co., president; A. H. BROWN, International Harvester Co., vice-president; CRAIG B. HAZELWOOD, treasurer; GEORGE B. TUTHILL, secretary; FRANK QUICK, Associated Management Engineers, A. K. BARR, Waukegon Foundry Co., J. S. KOZACKA, Lewis Institute, E. R. PROUT, Teletype Corp., and F. B. COYLE, International Nickel Co., Inc., directors.

Bain to Address Chemical Groups

A meeting of Society of Chemical Industry will be held jointly with American Chemical Society, Electrochemical Society and Societe de Chimie Industrielle, May 13, at the Chemists' Club, 52 E. 41st St., New York. EDGAR C. BAIN, United States Steel Corp., will present a paper on "Some Fundamental Characteristics of Stainless Steels."

• OBITUARIES •

CHARLES P. COTTRELL, 74, president, C. B. Cottrell & Sons Co., manufacturer of printing presses, died suddenly April 24 in Westerly, R. I. Mr. Cottrell was a staunch advocate of broaching as a machining method and used it extensively in the manufacture of presses.

FREDERICK G. BUCKLEY, 48, secretary and treasurer of Sterling Siren Fire Alarm Co., Rochester, N. Y., died suddenly April 16 while at work.

HERMAN J. EBERMAN, SR., 46, president and general manager of Canton Structural Steel Co., was killed in an automobile accident April 17.

GEORGE H. HANNUM, 55, formerly president and general manager of Oakland Motor Co. and more recently president of Hannum Mfg. Co., Milwaukee, Wis., died April 18 in Philadelphia.

THOMAS A. HAYES, one of the organizers of Western Pipe & Steel Co., San Francisco, died suddenly April 5.

ANTHONY HENNINGER, 64, director and employment manager of Warner Corp., gear manufacturer of Muncie, Ind., died recently at the plant.

LOUIS M. HOWE, 67, vice-president of Howe Fire Apparatus Co., Anderson, Ind., died recently at his home. The Howe company, formerly of Indianapolis, is believed to have built in 1906 the first motorized fire truck ever manufactured in this country.

JAMES KERNAN, SR., 78, former assistant secretary and treasurer of Bethlehem Steel Co., Bethlehem, Pa., died there April 15.

JOHN J. LEBHERZ, 77, former president of Niagara Frontier Brass Co., died recently in Niagara Falls, N. Y.

LEONARD T. MCELROY, 47, vice-president and general manager of Aero Supply Corp., manufacturer of airplane equipment, Corry, Pa., died suddenly April 19, at Findley Lake, N. Y.

DR. CARL LEO MEES, 79, president emeritus, Rose Polytechnic Institute, died April 19 at Terre Haute, Ind.

CHARLES C. MOORE, 63, president of C. C. Moore & Co. Engineers, San Francisco, Western representative for Babcock & Wilcox Co. and numerous other manufacturers of kindred equipment, died April 17.

GEORGE H. REESE, for many years general superintendent of the foundry of Dunning & Boschert Press Co., Inc., Syracuse, N. Y., died recently.

HOWARD STOCKTON, 90, former president of the old American Bell Telephone Co., died April 22 at his home in Boston.

WILLIAM H. TUTHILL, 78, founder of Tuthill Spring Co., Chicago, manufacturer of auto springs, died recently.

CHESTER WALLBRECHT, 40, superintendent of D. T. Williams Valve Co., Cincinnati, Ohio, died April 18.

Launch Drive to Lick Depression

An intensive drive to shake off the lethargy of depression will be started in Detroit during the week of May 4-5. At that time there will be concentrated in the Hotel Statler various associations, institutes and other industrial organizations attending the M-M-M Congress.

Following the lead of the automotive industry, which first made sure that it had a good product at the right price and then threw its whole heart and soul into a strong advertising and selling campaign in an effort to stimulate sales and help restore business to normal level, the Materials Handling Institute and other associations are determined to see what can be done along the same line by industry as a whole.

The movement is not confined to the group of associations which will be meeting in Detroit at the M-M-M Congress, but that time has been set for the firing of the first gun. Copies of a resolution sent to SECRETARY OF COMMERCE LAMONT have been forwarded to the Illinois Manufacturers' Association, Pennsylvania Manufacturers' Association, New England Council, National Automobile Chamber of Commerce and other similar organizations throughout the nation. From many of these have come replies indicating their willingness to do their utmost in furthering the drive.

It is felt that whereas each individual concern must work out its own salvation the difficulties of doing this will be greatly ameliorated if industrial concerns all over the country can be induced to pull together.

M.H.I. to Meet

R. L. LOCKWOOD, U. S. Department of Commerce, will speak on "What the Materials Handling Institute Can Accomplish," and JOHN VAN DEVENTER, editor, *Iron Age*, will speak on "Licking the Octopus of Depression" at the regular business meeting of the Materials Handling Institute on Thursday evening, May 5, at the Hotel Statler, Detroit. The Institute, founded last December, now has approximately 80 member-companies.

As a result of these activities not a little has been accomplished. Transportation, both rail and road, as well as transportation of materials inside the plants, has improved greatly. Daily freight car loading has advanced 50 per cent beyond that of last year.

A considerable increase in production in the first quarter of 1932 over the corresponding quarter last year is reported by the Amtorg Trading Corporation. Pig iron production during the quarter totaled 1,398,000 metric tons, or 27.5 per cent more than during the first three months of last year. Steel output amounted to 1,468,000 tons and rolled products amounted to 1,144,000 tons, showing gains of 16 and 22.5 per cent, respectively.

Soviet Industries Overcome Difficulties, Mass Production of Dirigibles Planned

ALMOST in the same breath there came from Russia news of a plan to build dirigibles on a mass production scale, reports of difficulties in practically all branches of the Soviet industries and advices from ROBERT P. LAMONT, JR., son of the American Secretary of Commerce, that American officials and business men should change their policy toward commerce with Russia.

COMRADE POURMAL, chief of lighter-tran-aircraft construction of the Soviet described dirigible construction in the United States as "handicraft production" and told of plans to build an intricate network of dirigible transport as an aid to the rail and water ways, especially in carrying passengers, mail and perishable goods.

"Dirigibles can be constructed and utilized properly only in the Soviet Union," the *New York Herald Tribune* reports Comrade Pourmal as having said. "No capitalist country can construct such craft on a large scale. Even the United States, with its large financial and technical resources, carries out its dirigible construction on a handicraft scale, producing only one or two ships yearly.

"We consider that such a scale of construction and utilization is amateurish. It would not be worth our time and money were we to undertake dirigible building at the American rate. We plan to have both rigid and semi-rigid ships of varying sizes."

A large dirigible construction plant near Moscow is expected to be completed this autumn. Comrade Pourmal said much preliminary work was necessary, such as training a technical staff. In the meantime foreign technical aid will be drawn up. UMBERTO NOBILE, who commanded the Italia's flight to the North Pole, will take a conspicuous part in designing and constructing the air fleet under contract with the Soviet.

Meanwhile, amid the planning of new industries, the Soviets are having trouble with the old ones. WALTER DURANTY, writing for the *New York Times* from Moscow, reports a big Spring cleaning in Soviet industry, the purpose of which is to "shorten the period of infantile maladies," as they are called in Russia. Among these maladies may be listed disorganization in the Nizhni-Novgorod automobile plant, previously reported, and the fact that two large coal mines in the Donetz area, started three years ago, are still operating at less than one-third of their annual capacity of 1,000,000 tons.

Much of the trouble seems to arise from labor difficulties and these labor difficulties seem to arise from poor labor discipline. Lack of discipline arises from undue interference by the local Communist party and from labor organizations, and from lack of any single command. In an effort to overcome these difficulties drastic changes are being made in local Communist party and labor unions and "shock brigades" of the best Communist youths of the various industries are being thrown into the breach in order to clear up the trouble.

• MEETINGS •

AMERICAN MANAGEMENT ASSOCIATION
Annual meeting, Hotel Pennsylvania, New York, May 2, 1932.
Annual meeting, Institute of Management, Hotel Pennsylvania, New York, May 5, 1932. W. J. Donald, Managing Director, 20 Vesey St., New York, N. Y.

GRAY IRON INSTITUTE
Mid-year meeting, Hotel Statler, Detroit, Mich., May 3. Arthur J. Tuscany, manager.

FOUNDRY AND INDUSTRIAL EXPOSITION
Also 36th annual convention, American Foundrymen's Ass'n, Hotel Statler, Detroit, Mich., May 3-5. C. E. Hoyt, manager, American Foundrymen's Ass'n, Inc., 222 W. Adams St., Chicago.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS
Conference on maintenance, management and materials handling, Hotel Statler, Detroit, Mich., May 4 and 5. Aeronautical division. Annual meeting, Buffalo, N. Y., June 6-8. Calvin W. Rice, 29 W. 39th St., New York, N. Y., secretary.

AMERICAN GEAR MANUFACTURERS ASS'N
Sixteenth Annual Meeting, Hotel Statler, Cleveland, Ohio, May 12-13. Executive Committee meeting, same place, May 11. T. W. Owen, secretary, 3608 Euclid Ave., Cleveland, Ohio.

CHAMBER OF COMMERCE OF UNITED STATES
Annual meeting, Palace Hotel, San Francisco, May 17-20. D. A. Skinner, 1615 H St. N.W., Washington, D. C., secretary.

SOCIETY OF AUTOMOTIVE ENGINEERS
1932 summer meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., June 12-17. John A. C. Warner, secretary, 29 W. 39th St., New York, N. Y.

AMERICAN SOCIETY FOR TESTING MATERIALS
Annual meeting, Atlantic City, June 20-24. R. E. Hess, assistant secretary, 1315 Spruce St., Philadelphia, Pa.

NATIONAL METAL CONGRESS & EXPOSITION
174th Regiment Armory, Buffalo, N. Y., Oct. 3-7. Sponsored by A.S.S.T., with cooperation of A.S.M.E., Institute of Metals and Iron & Steel Divisions of A.I.M.E., A.W.S., and the Wire Association. W. H. Eiseman, 7016 Euclid Ave., Cleveland, Director.

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Opportunities for Future Business

Ind., Indianapolis—Board of School Commissioners, A. G. Good, Bus. Mgr., will receive bids until May 10 (extended date) for remodeling Arsenal building at Arsenal Technical School, 1500 East Michigan St. D. A. Bohlen & Sons, 1001 Majestic Bldg., Archts. Noted April 7.

Ia., Council Bluffs—Bouricious Battery Co., G. Bouricious, Pres., plans to rebuild battery plant recently destroyed by fire. Estimated cost including equipment. $20,000.

Kan., Salina—Cardinal Stage Lines, plans reconstruction of service station and garage recently destroyed by fire. Estimated cost $50,000.

Mass., Brookline—Board of Selectmen, having plans prepared for construction of a garage in rear of police station. Estimated cost $40,000. Private plans.

Mass., Haverhill—A. & F. E. Kelly, plans reconstruction of a garage destroyed by fire on Main St. Estimated cost $75,000. Architect not selected.

Mass., Reading—Municipal Department, 177 Main St., plans addition and alterations to municipal garage on Ash St. Estimated cost $40,000. Private plans.

Mass., Wellesley—H. O'Shaughnessy, c/o J. J. O'Shaughnessy, 80 Boylston St., Boston, Archt., awarded contract for construction of a 1 story service station at Washington and River Sts. Estimated cost to exceed $40,000.

Minn., Duluth—William B. Arper Co., 318 East Superior St., receiving bids for a 1 story, 36 x 125 ft. repair and service garage at Sixth Ave. E. and Superior St. Estimated cost $20,000. Berg & Olson, 421 Bradley Bldg., Archts. Noted March 10.

Minn., Eveleth—John Pazzello, will build a 1 story repair and service garage. Lundgren Motor Co., lessee.

Minn., Litchfield—F. A. Kopplin, will build a 1 and 2 story, 72 x 74 ft. repair and service garage. Private plans.

Minn., St. Paul—Minnesota Fence & Wire Works, 240 University Ave., will build a 2 story addition and make alterations to present plant. M. O. Buetow, 1380 Blair St., Archt. Noted December 17.

Neb., Omaha—Gross Box Co., 320 Pierce St., plans addition and alterations to factory. Private plans.

N. H., Concord—Aranosian Oil Co., West Concord, having revised plans prepared for construction of a 1 and 2 story garage and storehouse. Estimated cost $40,000. N. Simons, 33 North Main St., Concord, Archt. Former bids rejected. Noted February 25.

N. H., Rochester—Standard Oil Co. of New York, Park Square Bldg., Boston, awarded contract for construction of a 1 story service station here. Estimated cost $25,000. Noted March 31.

N. J., Elizabeth—Board of Education, 417 South Broad St., plans construction of a 2 story boys vocational school. Estimated cost $150,000. H. B. Brady Inc., 333 North Broad St., Archts. Maturity in fall. Noted February 18.

N. J., Hoboken—Hoboken Land & Improvement Co., 1 Newark St., plans construction of a paper manufacturing plant at Monroe and Madison Sts., between Ninth and Eleventh Sts. Estimated cost $400,000. Architect not selected. Hinde & Dauch, 253 Water St., Sandusky, O., lessee.

N. J., Newark—Alling Corp., 33 Ward St., having revised plans prepared for a 1 stroy garage at 36-42 Columbia St. Estimated cost $42,000. William E. Lehman, 972 Broad St., Archt. U. S. Post Office Department, Washington, D. C., lessee. Noted April 7.

N. J., Paterson—Coalator Stoker Co., c/o S. L. Beber, 5 Colt St., leased premises to be equipped for manufacture of stokers. Owner now purchasing equipment.

N. Y., Brooklyn—P. W. Connelly, 63 Church St., will build a 1 story, 125 x 230 ft. service garage at Gravesend and Ditmars Ave. B. Driesler, Jr., 153 Remsen St., Archt. Noted April 21.

N. Y., Brooklyn—Epstein & Schoor, 4th Ave. and Third St., will build a 40 x 100 ft. service garage. W. C. Lacerenza, 16 Court St., Archt. Work will be done by separate contracts. Noted March 24.

N. Y., Brooklyn—J. Harms Auto Delivery Co., 277 Moffat St., will build a 1 story, 100 x 100 ft. service garage and gas station at Moffat St. and Knickerbocker Ave. G. I. Prowler, 367 Fulton St., Archt. Work will be done by separate contracts. Noted April 7.

N. Y., Brooklyn—L. Schwartz, 634 Elton St., will build a 1 story, 60 x 100 ft. service garage at Ashford St. and New Lots Ave. I. Kirshenblit, 1125 Eastern Parkway, Archt. Work will be done by general and separate contracts about November. Noted April 7.

N. Y., Maspeth—Charles Hofstetter, 2273 41st Ave., Astoria, will build a 1 story automobile repair shop at 56th Road and 58th St. here. Work will be done by separate contracts and will make purchases early fall. Noted April 14.

N. Y., New York—Morris Marks, 470 East 133rd St., having sketches made for construction of a 2 story, 100 x 125 ft. service garage at St. Anns Ave. Blvd. and 132nd St. Estimated cost to exceed $115,000. J. J. Gloster, 303 West 42nd St., Archt.

N. D., Wahpeton—Wahpeton Glass, Paint & Supply Co., Redlinger & Hansen, Props., 504 Dakota St., will build a sash and door factory including auto paint and repair shop.

O., Ada—Ohio Northern University, will move present engineering equipment to recently acquired plant of McCurdy Manufacturing Co., and is considering installation of electrical, mechanical, hydraulic, highway and materials-testing laboratories.

O., Troy—Hobart Cabinet Co., C. C. Hobart, Jr., Pres., leased plant unit formerly occupied by Waco Aircraft Co. for future expansion.

O., Youngstown—Automatic Industries Inc., C. W. Froom, will build addition to plant for the manufacture of game boards using metal pegs. Estimated cost $100,000.

Tenn., Chattanooga—New Era Electro Devices Inc., plans erection of a new plant for the manufacture of automatic controls for textile and other machines if refinancing is successful.

Tex., Houston—Continental Can Co., 1 Pershing Sq., New York, N. Y., will receive bids after July 1 for a can manufacturing plant here. Estimated cost $100,000. Favrot & Livaudais, Hibernia Bldg., New Orleans, Archts. Noted March 24.

Va., Pulaski—Pulaski Hardwood Flooring Co., plans reconstruction of woodworking plant recently destroyed by fire. Estimated cost $40,000.

Wis., Milwaukee—Lemke Electric Co., 635 North 8th St., plans reconstruction of plant destroyed by fire. Estimated cost $40,000.

Wis., Wausau—Underwood Veneer Co., O. C. Lemke, Mgr., Thomas St., plans to rebuild plant recently destroyed by fire. Architect not selected.

Ont., Niagara Falls—Carborundum Co., awarded general contract for addition to factory.

Ont., Toronto—Exide Batteries of Canada Ltd., 153 Duffield St., awarded general contract for addition to plant. Estimated cost $40,000.

United Soviet Socialsit Russia—c/o Amtorg Trading Corp., 261 5th Ave., New York, N. Y., will build a can manufacturing plant, 62 million cans annual capacity at Slaviansk (North Caucasus), also reconstruction and reorganization of steel mill at Nogineak. Estimated cost approximately $45,000,000. Work will be done by day labor and technical aid contracts. Maturity soon.

Equipment Wanted

D. C., Washington—Bureau of Supplies & Accounts, Navy Department—will receive bids until May 17 (extended date) for motor driven testing machinery for Navy Yard. Sch. 7790.

D. C., Washington — Procurement Division, Veterans Administration—will receive bids until May 5 for combination electric woodworking machines during six or twelve months period. Cir. 487-M.

Mass., Boston—Bureau of Supplies & Accounts, Navy Department, Washington, D. C.—will receive bids until May 3 for a motor driven turret lathe for Navy Yard here. Sch. 7887.

Minn., Duluth—United Electric Service Co., 301 East Superior St.—large type jumbo brake machine.

Minn., Minneapolis — John A. Phelan, Jr., 1229 South Fifth St. (wood novelty manufacturer)—screw cutting lathe.

Minn., Minneapolis—Wire Specialty Manufacturing Co., 105 Glenwood Ave.—spot welder machine.

Minn., Silver Creek—S. Johnson—planer, surfacer and matcher or small surfacer.

Neb., Lincoln—State Board of Control, O. R. Shatto, Secy.—will receive bids until May 3 for machinery and equipment for 1 story, 50 x 120 ft. plant for making license plates at State Reformatory.

N. J., Picatinny Arsenal—Commanding Officer—will receive bids until May 2 for seven routing milling machines. Cir. 306.

Utah, Ogden—Division of Purchase, Sales & Traffic, Department of Agriculture, Washington—will receive bids until May 6 for two portable electric arc welders here. Pro. 1479.